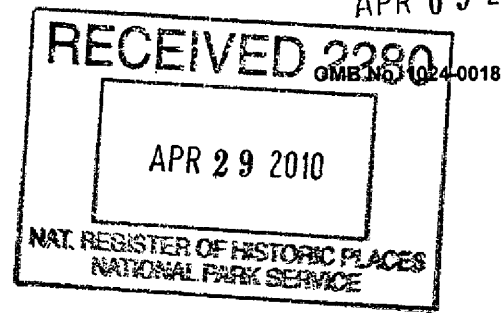


United States Department of the Interior
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National Register of Historic Places Multiple Property Documentation Form

This form is used for documenting multiple property groups relating to one or several historic contexts. See instructions in *How to Complete the Multiple Property Documentation Form* (National Register Bulletin 16B). Complete each item by entering the requested information. For additional space, use continuation sheets (Form 10-900-a). Use a typewriter, word processor, or computer to complete all items.



☒ New Submission ☐ Amended Submission

A. Name of Multiple Property Listing

Archaeological Resources of Initial Variant of the Middle Missouri Tradition in Iowa

B. Associated Historic Contexts

(Name each associated historic context, identifying theme, geographical area, and chronological period for each.)

Big Sioux Phase, A.D. 1100-1250

C. Form Prepared by

name/title Lynn M. Alex and Cynthia L. Peterson / Archaeologists
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organization Office of the State Archaeologist, The University of Iowa date April 1, 2010

street & number 700 Clinton Street Building telephone 319-384-0732

city or town Iowa City state Iowa zip code 52242

D. Certification

As the designated authority under the National Historic Preservation Act of 1966, as amended, I hereby certify that this documentation form meets the National Register documentation standards and sets forth requirements for the listing of related properties consistent with the National Register criteria. This submission meets the procedural and professional requirements set forth in 36 CFR Part 60 and the Secretary of the Interior's Standards and Guidelines for Archeology and Historic Preservation. (See continuation sheet for additional comments.)

Baibara Mitchell DSHPO
Signature and title of certifying official

April 16 2010
Date

STATE HISTORICAL SOCIETY OF IOWA

State or Federal agency and bureau

I hereby certify that this multiple property documentation form has been approved by the National Register as a basis for evaluating related properties for listing in the National Register.

Cynthia L. Martin Gubert
Signature of the Keeper

6/11/10
Date of Action

Archaeological Resources of the Initial Variant of the
Middle Missouri Tradition In Iowa
Name of Multiple Property Listing

Iowa
State

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Provide the following information on continuation sheets. Cite the letter and the title before each section of the narrative. Assign page numbers according to the instructions for continuation sheets in *How to Complete the Multiple Property Documentation Form* (National Register Bulletin 16B). Fill in page numbers for each section in the space below.

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Name of repository:	
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Paperwork Reduction Act Statement: This information is being collected for applications to the National Register of Historic Places to nominate properties for listing or determine eligibility for listing, to list properties, and to amend existing listings. Response to this request is required to obtain a benefit in accordance with the National Historic Preservation Act, as amended (16 U.S.C. 470 *et seq.*).

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E. Statement of Historic Context

Introduction

Big Sioux and Little Sioux phase sites of northwest Iowa, known collectively as the Mill Creek culture, signify the beginning and demonstrate the actual origin and initial development of the Middle Missouri tradition (MMT) of the Plains Village pattern (Lehmer 1954, 1971). The present document develops only the Big Sioux phase historic context. A second historic context, the Little Sioux phase, should be developed at a later date. Sites included in a previously defined Perry Creek phase (Henning 1982a, 1982b, 1982c, 1996) are herein placed in the Big Sioux phase for reasons described later in this document. Both Big and Little Sioux phases reflect the response of indigenous, resident Late Woodland societies to significant economic and social processes occurring throughout the Prairie-Plains region a millennium ago. Once established, the Middle Missouri tradition presented a new phenomenon on the Prairie-Plains—a lifeway based on self-sustaining, compact, sedentary villages and a tribal society that successfully persisted for over eight centuries (Tiffany 2007a). In this process we see the domestication of the landscape itself and the use of the earthlodge as a physical dwelling and a metaphor of life and the cosmos (Roper 2007). We also catch the very first glimpse of an adaptive system that remained a legacy among peoples first documented by Euroamerican explorers, traders and artists on the Upper Missouri beginning in the 17th century.

The Big and Little Sioux phases encompass sites found in two geographical regions called the Big (formerly Sioux City) and Little Sioux localities (Bryson and Baerreis 1968; Henning 1969a; Tiffany 1982a; Vis and Henning 1969). The whole complex is what constitutes the “Mill Creek culture” (Tiffany 1982a:3). Modern researchers concur (Alex 1981a; Anderson, 1969a, 1981; Tiffany 1982a) that the Big and Little Sioux phases belong to the Initial variant (formerly horizon), a temporal category of the MMT (a.k.a, IMMT; see Johnson 2007b for detailed history of the MMT taxonomy). As originally defined, the MMT represents one of three major culture-historical traditions along the Missouri River and its tributaries that reflect the Plains Village pattern (Lehmer 1954, 1971). The MMT has been subdivided into three major divisions, from early to late: Initial, Extended, and Terminal variants (formerly called horizons).

The earliest MMT villages were established by A.D. 1100; the last date to A.D. 1450–1500, with sites in Iowa dating A.D. 1100–1250 (Ahler et al. 2007). Whether Plains villagers of the Initial variant, including those of the Big and Little Sioux phases, contributed to descendant populations is unknown. Recent research in South and North Dakota confirms that later Middle Missouri populations (Extended and Terminal variants) are protohistoric ancestral communities of the Siouan-speaking Mandan and some Hidatsa peoples. Some have more recently suggested (Tiffany 2007b) that some of these later Middle Missouri populations may have been partially incorporated into the Initial Coalescent tradition, a trajectory ultimately leading to Caddoan-speaking Arikara peoples.

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The Initial variant has been subdivided into eastern and western geographical manifestations (Henning and Henning 1978; Toom 1992a). Joining the Little and Big Sioux phases in the eastern division are the Cambria phase in Minnesota and the Lower James (Alex 1981a) and Brandon phases in eastern South Dakota, although Henning and Toom (2003) have suggested removing Cambria. The western division includes localities along the Missouri River trench in central South Dakota with 5 defined phases: Swanson, Grand Detour, Anderson, Sommers and Cattle Oiler (Henning and Toom 2003; Tiffany 2007a) (Figure 1). Some researchers have also proposed a Great Oasis phase as an early member of the MMT (Henning 2001; Johnson 2007a, 2007b). Member phases generally represent coeval, mostly fortified, village farming communities found in discrete site clusters or localities, believed to reflect semiautonomous populations who moved within their respective locality, rebuilding, and in some cases reoccupying earlier village sites (Tiffany 2007a:5). The historical relationship between communities in the eastern and western divisions of the Initial variant is the subject of continued research which has led to hypotheses regarding the origin and evolution of the tradition itself.

MMT peoples, including Big and Little Sioux phase communities in Iowa, lived in compact villages with houses often arranged in rows; and subsisted on a dual economy of bison hunting and horticulture, with gathering of wild plants and utilization of smaller animals adding to the subsistence based on an annual cycle. Recent studies in Iowa have indicated the survival of rare ridged agricultural fields and possibly corn hills (Gartner 2003). The relative importance of various subsistence activities is the subject of recent research (Tuross and Fogel 1994). Village fortifications at some sites consist of ditches and wooden post palisade defenses replaced in later MMT villages by fortifications with bastions. Sites vary from a few to over 50 houses. Most were semisubterranean, rectangular wooden post structures usually twice as long as wide, with entrances at one end, subfloor storage or cache pits within and between houses, and central hearths. Some appear banked or covered by earth. Most sites produce large quantities of grit-tempered pottery, ground and chipped stone tools, chipped stone flaking debris, bone and shell implements and items of personal adornment, fire-cracked rock, and butchered animal bone. Ceramics exhibit varied surface treatments with flared and S-shaped rims decorated with tool impressions, crosshatching, and geometric designs using trailed lines or twisted cords. Nonlocal materials, particularly pottery, shell, and stone point to external relationships. Known burial sites include cemeteries, ossuaries, and single interments within villages. Other site types are relatively unknown (Johnson 2007b; Tiffany 2007a).

The purpose of *Archaeological Resources of the Initial variant of the Middle Missouri tradition in Iowa* Multiple Property Documentation Form (also referred to here as the Multiple Property Documentation Form or MPDF) is to provide a context for nominating significant sites of the Initial variant of the Middle Missouri tradition in Iowa for inclusion on the National Register of Historic Places (NRHP). Relevant sites can be organized into at least two contexts. The "Big Sioux Phase, A.D. 1100–1250" context is fully developed within this MPD. The second context, the "Little Sioux Phase, A.D. 1100–1250," is briefly discussed herein and should be fully developed at a future date. Henning (1996) had proposed a Perry Creek phase to encompass sites such as Larson (13PM61) and Gytens (13PM60), which produced substantive assemblages of both Mill Creek and Great Oasis ceramics. The preponderance of a Mill

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Creek assemblage in the excavations at 13PM61, however, led Henning to declare Larson, and tentatively 13PM60, as single component which "principally reflects the Mill Creek tradition and minimally reflects the Great Oasis tradition" (1996:15), and strongly suggests their affiliation with other IMMT sites in Iowa. For this reason both of these sites are here included within the Big Sioux phase context. Future researchers may consider the merits of establishing a separate context for sites such as these.

A number of historic overviews from many previous archaeological and archival studies and other sources were used in developing this historic context. They include but are not limited to Alex 1981a, 1981b; Alex 1980, 2000; Ahler et al. 2007; Anderson, 1969a, 1972, 1975c, 1987; Bryson and Baerreis 1968; Fishel 1995a; Flanders 1960; Fugle 1962; Henning 1996, 2005, 2007; Henning, ed. 1968, ed. 1969; Henning and Henning 1978; Henning et al. 1968; Hurt 1951a; Ives 1956, 1962; Johnson 2007a, 2007b; Keyes 1927, 1951; Lehmer 1954, 1971; Lensink 2003a; Lensink and Tiffany 2005a, 2005b; McKusick 1964; Orr 1942; Peterson 1967a, 1967b; Tiffany 1982a, 1983, 1991a, 1991b, 2007a; Toom 1992a, 1992b; Vis 1968; Vis and Henning 1969; Wood 2001. Whittaker (2010) has conducted the most recent archaeological and archival work at a Big Sioux phase site, at Kimball Village (13PM4).

Outline of Significant Events: Initial Variant Middle Missouri Tradition in Iowa (Mill Creek)

An outline of significant events in the formation, occupation, abandonment, demise, and subsequent study of Initial variant Middle Missouri tradition Mill Creek (Big and Little Sioux phase) sites is presented below.

A.D. 1100

This is the date of the first known habitations of Initial Middle Missouri variant peoples in Iowa in two localities, Big and Little Sioux. Archaeological evidence suggests these communities arose *in situ* from local, resident Late Woodland societies including Great Oasis (Henning 1967, 1971b, 1996, 2007; Henning and Toom 2003; Lensink and Tiffany 2005a, 2005b; Tiffany 2007a; Tiffany and Alex 2001; Tiffany et al. 1998). Still debated is whether Great Oasis communities constitute a terminal Late Woodland culture (Henning 1996, 1998; Henning and Henning 1978; Lensink and Tiffany 2005a, 2005b; Tiffany 1983; Tiffany and Alex 2001; Tiffany et al. 1998) or an emergent member of the Initial variant (Henning 2005, 2007). Archaeological evidence in South Dakota demonstrates a contemporaneous, parallel development of some Initial variant peoples from local Late Woodland groups (Henning and Toom 2003; Johnson 2007a, 2007b; Tiffany 1983). Other early Initial variant people (including some from what is now Iowa) may have moved into modern South Dakota along the Missouri River and its tributaries contributing to the origin of later Initial variant groups there (Toom 1992c; Wood 2001). Researchers believe that the Initial Middle Missouri variant in Iowa (and probably elsewhere) represents a relatively small population that over time split away from parent villages into new communities relocating and reoccupying sites in a given locality partly in response to local resource depletion particularly of timber, farmland, and game (Anderson 1987; Tiffany 2007a; Toom 1992a).

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A.D. 1300

The Initial variant ceases as a recognizable archaeological entity in the Prairie Peninsula region after A.D. 1300 (Ahler et al. 2007), with the last known occupations in Iowa dating to A.D. 1250. Mill Creek sites in northwest Iowa after A.D. 1250 are superseded by occupations belonging to the Oneota tradition. Researchers have pointed to the contemporaneous decline of Cahokia (a World Heritage Site near modern St. Louis) and its relationship to the demise of the Initial variant and the spread of Oneota (Henning 2007; Tiffany 2007a). The Initial variant may have evolved into some villages on the Missouri River recognized as the Extended Middle Missouri variant (Johnson 2007b:49) or perhaps been partially incorporated into the Initial variant of the Coalescent tradition (Tiffany 2007b). Skeletal studies of Initial variant specimens in Iowa, although rare, suggest a relationship between individuals from the Big Sioux phase Broken Kettle site (13PM1) and the Initial Coalescent population at Crow Creek in South Dakota (Owsley et al. 1981). Other studies support a similarity between Initial variant individuals and a pooled "Mandan" group consisting of individuals from all Middle Missouri variant sites and the Heart River (Mandan) complex in North Dakota (Ahler et al. 2007:108; Jantz 1976; Jantz and Willey 1983).

A.D. 1730–1740s

The first European explorers reached the Missouri River in what is now North Dakota (1738) and South Dakota (1743), with trade goods already appearing in Dakota sites by 1600–1650. Historical accounts, coupled with later archaeological and ethnographic data, show that the Siouan-speaking Mandan and perhaps Hidatsa may be in some way the cultural descendants of the Initial variant people via the Extended Middle Missouri variant and the Terminal Middle Missouri variant. There is a strong continuity between the Extended Middle Missouri variant and the Terminal Middle Missouri variant leading to the Mandan. The minimal skeletal data from Big Sioux phase sites, however, indicate an affiliation with Coalescent and its descendant Arikara populations and culture history, and not necessarily the Extended Middle Missouri to Terminal Middle Missouri variant sequence leading to the Mandan in particular. Some archaeologists, however, suggest that there is no demonstrable association between the Initial variant and any historic tribe on the Plains (Tiffany 2007a:13; Winham and Calabrese 1998:299; Wood 2001).

Summary of Previous Investigations: Initial Variant Middle Missouri Tradition in Iowa (Mill Creek)

Mill Creek earthlodge villages have fascinated archaeologists since the contents were first studied in the 1870s. Over the past 130 years, professionals and laypersons alike have excavated these villages in an effort to understand the people who lived in northwest Iowa nearly 1,000 years ago. Five overlapping stages of archaeological work have characterized Initial variant studies in Iowa.

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Stage 1, 1870s–1920s: Antiquarians, Amateurs, and Academies

Charles R. Keyes first defined and named a series of large, archaeologically-rich sites along the Big and Little Sioux rivers and their tributaries in northwestern Iowa, the “Mill Creek culture” after the location of their greatest concentration and the point where they first attracted attention (Keyes 1927; Perry 2007). Sites subsequently named Mill Creek by Keyes, were reported early in the Euroamerican settlement of northwestern Iowa and investigated by resident farmers, relic hunters, and early scientific academies throughout the second half of the nineteenth century (Anderson 1975c; Banks and Lilly 1968). Some of these “excursions” and their results were reported in newspaper accounts, early county histories, and correspondence (Banks and Lilly 1968; Garretson 1910; Marks 1910; Powers 1910; Stafford 1906; Wakefield 1887; Western Publishing Company 1882). The elevated contours of some Mill Creek sites, the result of village debris and soil accumulation, raised their profile over two meters above the surrounding landscape. Mill Creek sites were labeled as “Indian mounds” and even as “Forts” on some early plats (Ogle 1911; Perry 2007).

In the 1882 *History of Western Iowa*, the section on Woodbury County offers a chapter on “Indian Antiquities;” it described the area as the

home of another and more civilized people, of whom, unfortunately, but little can now be known. Their principal city was on the Broken Kettle Creek, about seven miles northwest of Sioux City. There a circular elevation, several acres in extent rise to the height of from six to ten feet above the level of the bottomland. But few explorations of this village mound have been made, and the most that is known of it comes from observations taken of the site where the Broken Kettle Creek has cut into the mound... The peculiar feature of the mounds, and the one from which the creek takes its name, Broken Kettle, is the numerous remains of pottery found (Western Publishing Company 1882:212–213).

This is one of the first published references to the Broken Kettle Site (13PM1), a substantial midden-mound village 12 miles north of Sioux City on Broken Kettle Creek and the focus of much early interest in the archaeology of the Big Sioux locality (Banks and Lilly 1968; Powers 1910; Stafford 1906; Wakefield 1887; Western Publishing Company 1882). On July 23, 1887, a letter by George W. Wakefield to Spencer Baird of the Smithsonian Institution, describes the mound rising 10 feet above the surrounding surface and cut through by the creek exposing a profile 6–8 feet in height with layers of ash and earth mixed with pottery and stone artifacts (Wakefield 1887). Wakefield reported on the site at a time when the property was owned by C. R. Marks between 1878 and 1895. Marks, himself, in a letter to the Sioux City Academy of Sciences and Letters (September 28, 1910) reported on an excursion of prominent citizens to the site for exploratory purposes sometime during this period, results of which included the discovery of human skeletal remains (Lilly and Banks 1965a, 1965b).

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An extended description of the Broken Kettle site, its excavation, and discoveries was published in an article in the *Proceedings of the Academy of Sciences and Letters of Sioux City* by W. T. Stafford (1906:85–102). Stafford describes the mound as 350 feet long and 115 feet wide with a height of 9 feet 6 inches from the “original soil” which was cross-sectioned. He notes the presence of marine shell among the artifacts recovered. He also describes a “burial place or graveyard: a half mile east of the site on the summit of a sharp hill,” adding that the entire top of this bluff is “thickly strewn with remains” and further describes what was apparently the excavation of burials suggestive of an ossuary. He also comments on the occurrence of other “burial hills” in the vicinity (ibid: 101).

Another letter written by A. S. Garretson to the Academy’s curator H. C. Powers four days prior to that of Marks, describes a four day excavation beginning on September 20, 1910 by Garretson and B. F. Chamey, a drainage engineer from Homick, Iowa, and two other diggers. Powers himself reported on the results of this investigation in an article dated October 14, 1910 (Banks and Lilly 1968; Powers 1910). By this time, the Broken Kettle Mound is described as 150 feet in diameter from south to north. A six-foot trench, 75 feet to the center of the mound from the south edge, was excavated. The depth of the trench at the center was 12 feet. Two six foot squares also were dug to sterile soil in the opposite corners of the mound. This exploration produced the first plan view of the Broken Kettle Site (Figure 2). Robert James, the owner of Broken Kettle in 1910, is also known to have excavated a large silo trench into the site a short time after Garretson’s excavation (Banks and Lilly 1968). Eyewitnesses describe the disturbance of large pits full of burnt corn, bison bone, and pottery.

As later noted (Orr 1942:63–64), Kimball Village (13PM4) another large Mill Creek site three miles south of Broken Kettle on the Big Sioux River, went largely unnoticed except perhaps for successive owners or tenants of the property who allowed artifact collecting, and a reference by Orr to a former owner or tenant who excavated a “deep pit” somewhere on the site, finding bones, clam shells, pottery and ashes (Orr 1942:64). According to Orr it was W. C. French, an officer of the Civilian Conservation Corps (CCC) camp, three miles south of Kimball Village, and an artifact collector, who learned of the site from a tenant farmer (Orr 1942:64). The fact that sites like Kimball Village were not exposed by erosion as at Broken Kettle masked the more obvious evidence of cultural activity.

Stage 2, 1920s–1960s: First Scientific Investigations

Beginning with the interests of Charles R. Keyes in the 1920s, and his appointment in 1921 to head up the Iowa Archaeological Survey under the auspices of the State Historical Society of Iowa, the prehistoric sequence of Iowa was set to unfold. Keyes’ activities on behalf of the Mill Creek sites of northwest Iowa produced details of the culture he first defined (Keyes 1927, 1941a, 1942) and established the basis for their classification according to emerging North American taxonomic systems (Anderson 1975c; Griffin 1935; Hurt 1951a; Keyes 1935a). Until the end of this period there were virtually no professional archaeologists working in Iowa and many amateur efforts went unrecorded. Keyes’ efforts were aided by

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correspondence and contact with local archaeological enthusiasts in northwest Iowa and professionals throughout the Midwest and Plains. A number of northwest Iowa residents, particularly those in the Cherokee area such as Nestor Stiles and A. A. Christiansen, collected, mapped, and conducted excavations at some Mill Creek sites and shared their discoveries first hand and via correspondence with Keyes (Anderson 1975c; Perry 2007). Another of these individuals was the Reverend Frank Van Voorhis, a minister and amateur archaeologist from Sutherland and Alta, Iowa. Van Voorhis excavated at several Mill Creek sites in Cherokee and O'Brien counties from 1934–1939 expending most of his early efforts at the Old Englishman's Ranch Site and in 1938 and 1939, excavating the Alta or Nec site, which he renamed Chan-ya-ta (Anderson and Tiffany 1978; Fugle 1957; Tiffany 1974a; Van Voorhis 1944, 1978). Beginning in 1934, Keyes coordinated excavations conducted by Ellison Orr as part of Works Progress Administration projects under Project 1047 of the Iowa Planning Board. Keyes heard repeated reports about Kimball Village from W. C. French, a CCC camp officer, beginning in 1936. Orr investigated the Phipps site (13CK21) on the Little Sioux, and Broken Kettle and Kimball villages beginning in 1934, 1935, and again in 1939 under the auspices of Project 3600. Orr completed his report on the excavations at the two Big Sioux phase sites in 1940 (Keyes 1940, 1941b; Orr 1942). He also reported the discovery of human skeletal remains both within the two villages, and salvaged burials from site 13PM127, a location probably first recorded in the early twentieth century (Orr 1942). No other major excavations were carried out at Mill Creek sites until the 1950s.

Throughout this period research along the Missouri trench and in southeastern South Dakota, much of it part of WPA and Reservoir Salvage projects, outlined the basic cultural-historical sequence of Plains village cultures and suggested similarities with sites on the Big and Little Sioux (Lehmer 1971). The work of William H. Over and Elmer E. Meleen at the Mitchell site in 1938 (Meleen 1938) and the Twelve Mile Creek site in 1939 on the James River, and the Brandon site on the Big Sioux in 1939 (Over and Meleen 1941) was especially pertinent. There were also indications that similar village sites existed in the region. The field notes of Over described a third village, the Bloom site in Hanson County, and based on an unprovenienced collection in the University of South Dakota Museum, Wesley Hurt would speculate on the existence in Davison County of a fourth village he called the Ethan site (Hurt 1951a:72), later suggested as the Goehring or Sheldon Reese village (Alex 1981a). In December 1935 at the Indianapolis Archaeological Conference, the Mill Creek complex was first classified according to the newly created Midwestern Taxonomic System (MTS) (McKern 1939). Based on the two geographical clusters, two Iowa foci were defined by Keyes (1935a), Big Sioux focus and Little Sioux focus (Fugle 1962). Both were placed in a Mill Creek aspect. The three similar South Dakota sites, Mitchell, Twelve Mile Creek, and Brandon were placed in an Over focus. In 1941 all three were combined into a Mill Creek aspect (Over and Meleen 1941:40–42).

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Keyes (1935a) and Griffin (1935) both addressed the Indianapolis conference on the topic of Mill Creek. Griffin drew parallels between Mill Creek and Middle Mississippian, while Keyes proved more cautious in drawing relationships (1935a:8). Griffin would later reiterate this connection and suggest that the northwest Iowa sites might represent a case of site unit intrusion (Willey and Lathrap 1967) from Old Village Cahokia (now Stirling phase) via Aztalan (Griffin 1942, 1946, 1949), an idea which persisted for some time (Ruppé 1957). Resemblances between Mill Creek and the historic Mandan tribe had also been alluded to by Plains researchers throughout these decades, Keyes having first suggested it himself (Keyes 1927; Strong 1935).

Stage 3, 1951–1960: Iowa Archaeological Society, Sanford Museum, and University of Iowa Projects

The year 1951 marks the organization of the Iowa Archeological Society (IAS) and the establishment of the Sanford Museum in Cherokee with W. D. Frankforter as the first director. The Northwest Chapter of the IAS, which also organized its first meeting in December of that year, was headquartered at the Sanford Museum and became the first local chapter of the IAS. Over the next two and a half decades the Sanford Museum under Frankforter and later Duane Anderson provided guidance to an enthusiastic amateur archaeology group. Chapter members were active recording sites, conducting surveys and some excavations, and raising funds for archaeological research including that conducted by the State University of Iowa (later The University of Iowa) and eventually the University of Wisconsin and University of Nebraska. Many of these activities were directed at Mill Creek sites and were briefly reported in the Northwest Chapter Newsletter and in both the Iowa Archeological Society Newsletter and Journal. Local individuals prominently associated with these projects included C. A. Thompson, Clinton Lawver, Earl Brewster, Merle Simonsen, Chuck and Shirley Smith, Dale and Marian Gifford, Joe and Bertie Beals, Ruth Thornton, Nestor Stiles, Roger Banks, David Lilly, Pat McAllister (Williams) and Paul Williams. Projects included the Sanford Museum and Northwest Chapter excavations (usually weekend projects) at the Phipps site as early as 1952, and joint Sanford and The State University of Iowa excavations under Reynold Ruppé at Phipps in 1955 and 1956 and at Wittrock in 1957 and 1959 (Ruppé 1955a, 1955b, 1957, 1959a, 1959b). University projects provided field school experience for students and as a result of this work, the essential nature and content of Mill Creek sites were analyzed and published in several M.A. theses by Ruppé's students (Flanders 1960; Fugle 1957, 1962; Ives 1956, 1962). Although no additional field investigations were conducted at Mill Creek sites in the Big Sioux locality, collections from the previous work of Keyes and Orr at Broken Kettle and Kimball were incorporated into some of these studies (e.g., Flanders 1960; Fugle 1962; Ives 1962). Ruppé's work led him to propose a subdivision of Mill Creek into three foci: Little Sioux, Big Sioux, and Waterman (Ruppé in Bryson and Baerreis 1968:9–10). It was his own suggestion that changes detected in the cultural stratigraphy at sites like Phipps or Kimball might have an environmental cause that presaged the University of Wisconsin-Madison studies of the subsequent decade (Bryson and Baerreis 1968:10; Ruppé 1959a, 1959b). In 1962 Ives (1962) proposed a reclassification of the Little and Big Sioux foci as phases replacing the MTS with the new classification of Willey and Phillips (1957). By this point also, Donald J. Lehmer (1954) had defined the Middle Missouri

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tradition confining it to a geographical area that did not include Mill Creek based on Hurt's problematic analysis. Flanders offered a chronological sequence of Mill Creek sites in the Little Sioux phase based on ceramic seriation using Ives' typology (Flanders 1960).

Stage 4, 1960s-1980: The Climatic Model

During this period research shifted from descriptive, cultural-historical reconstructions to an emphasis on processes of cultural change and the relationship between paleoclimate and human adaptation. In 1963 the University of Wisconsin-Madison began research to test the effects of environment on culture and culture change (Bryson and Baerreis 1968). Five Mill Creek sites, four on the Little Sioux (Wittrock, 13OB4, Waterman, 13OB2, Waterman Siding, 13OB3, Phipps, 13CK21) and Kimball Village on the Big Sioux River, were investigated. These sites were selected in part because they represented each of Ruppé's three foci. The Broken Kettle site was not chosen as it was considered too disturbed. While Kimball Village was noted to have been extensively tested in Orr's excavations, it was believed that considerable portions of the site remained and additional excavations were conducted (Bryson and Baerreis 1968:12). Baerreis did return to Broken Kettle in 1967 with Roger Banks and David Lilly, two stalwart members of the Northwest Chapter, in order to acquire materials for a radiocarbon date. The University of Iowa returned to Wittrock for more extensive excavations directed by Marshall McKusick in 1965 (Peterson 1965). McKusick reopened Ruppé's excavations to test different parts of the village including the stockade (Anderson 1975c:78).

The results of the Wisconsin project supported the notion that floral and faunal analyses and archaeological data in general could be used as a measure of past climate. Taken with the new suite of radiocarbon dates produced by the project, Mill Creek was confirmed to have developed during the Neo-Atlantic climatic episode, a warm moist regime, believed ideally suited to horticulture, and to have persisted into the droughtier Pacific I. This climatic model (Bryson and Baerreis 1968; Bryson et al. 1970; Lehmer 1970; Wendland 1978) established the conceptual framework for understanding Plains village cultures over the next two decades with climate viewed as one of the prime movers in the formation of the Middle Missouri tradition (Anderson 1987; Lehmer 1970; Tiffany 2007a:10).

The Wisconsin research and a few other contemporary projects in northwest Iowa trained and inspired an entire generation of Midwestern archaeologists who over the next two decades produced theses and dissertations on Mill Creek and the Initial Middle Missouri variant wrestling with such diverse issues as ceramic classification and seriation (Alex 1981a; Anderson 1972; Tiffany 1978b); economy and environment (L. Alex 1973; Benn 1974; Dallman 1977; Scott 1972, Wegner 1975; Zalucha 1982a), community patterns and social organization (Tiffany 1978b; Zimmerman 1971), and taxonomy and chronology (Peterson 1967a; Vis 1968). Both Anderson (1969a) and Henning (1970) argued for placing Mill Creek sites within the Initial horizon of the Middle Missouri tradition which eventually became the Initial variant, a temporal division (Lehmer 1971). The position of Mill Creek in the Initial variant was restated by Anderson in his

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ceramic study from the Brewster site (1972), L. Alex's faunal analysis (1973), Tiffany's research at Chan-ya-ta and Bultman (1978b), and Alex's excavations and analysis at the Mitchell, South Dakota site (1981a). Mill Creek sites on the Little Sioux received additional attention with The University of Iowa's salvage project at Skadeland (13CK402) again assisted by the Sanford Museum (Zimmerman 1971), and the Sanford Museum at Jones village (Williams 1975a).

The radiocarbon dates resulting from the Wisconsin investigations, added to the data acquired from sites with relatively shallow deposits and those with deep middens (e.g., Kimball Village), suggested to researchers that both Big and Little Sioux phases potentially spanned a 500 year occupation (Bryson and Baerreis 1968). A new seriation based on ceramics from Little Sioux phase sites (Vis and Henning 1969) provided a local, developmental sequence. Added to the long chronology, this supported the subdivision of the Little Sioux phase into an Early Little Sioux phase and a Late Little Sioux phase with some deep sites such as Phipps, 13CK21, demonstrating components of both (Henning 1969a; Bryson and Baerreis 1968). Information from the lower levels of deep midden deposits at Kimball and Phipps also led to the proposition that the earliest Mill Creek occupations were contemporaneous with Mississippian developments at Cahokia and likely an outgrowth of local Great Oasis communities and not a migration of Mississippian peoples (Anderson 1969a; Henning 1967, 1969a; Peterson 1967a, 1967b). Henning et al. (1968) proposed that those local resident cultures who adopted intensive corn agriculture and bison hunting became Mill Creek. Middle Mississippian characteristics as seen in later Mill Creek components pointed to contact with Cahokia via diffusion and trait unit intrusion (Henning et al. 1968; Henning 1969a).

The view of an origin of Mill Creek within Great Oasis was also made possible by the slowly accumulating evidence from Great Oasis sites including many on the Big Sioux such as Broken Kettle West-13PM25 and Joy Creek Minor-13PM8 (Peterson 1967a, 1967b; Henning 1967, 1971b; Lensink and Tiffany 2005a). An honors thesis by Drexel Peterson, a Harvard student supervised by Marshall McKusick of The University of Iowa, provided an insightful chronology and discussion of the relationship between Great Oasis and Mill Creek based on the excavation of House 1 at Broken Kettle West in 1967 (1967a) assisted by the Sanford Museum and Northwest Chapter members (1967b). The University of Nebraska, under Dale Henning's (1969b, 1969c, 1969d) direction returned to Broken Kettle West again in 1969 excavating three additional structures.

In addition to unexpected discoveries of human skeletal remains found within Mill Creek villages such as Broken Kettle and Kimball, other burial sites with probable Mill Creek affiliation had been reported since the end of the 19th century (Banks and Lilly 1968; Stafford 1906) and documented by Keyes and Orr (Orr 1942). In the 1960s and 1970s a number of disturbed or vandalized burial sites received attention from both the amateur and professional communities at sites that included the Kimball Burial—13PM23, Rock Creek Ossuary—13PM65, 13PM172, and Siouxland Sand and Gravel—13WD402 (Anderson and Baerreis 1973; Fisher 1977b, 1983; Lilly and Banks 1965a, 1965b; Williams 1983). It was the

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accidental unearthing of human remains and artifacts at the Siouxland Sand and Gravel site (13WD402) beginning in 1972, however, that proved the most significant both for the spectacular artifacts uncovered, and the confrontation with the American Indian community, including the American Indian Movement (AIM), that this incident precipitated (Anderson et al. 1979; Fisher 1978b, 1980; Hawkins 2008; Lillie 2004b; Lillie and Schermer 1990). Ultimately this event helped bring about the passage of Iowa's protective burial legislation in 1976, the first such law in the U.S. (Anderson et al. 1979).

Research beginning in the early 1970s on Initial Middle Missouri variant sites, including those in Iowa, was increasingly part of Cultural Resource Management studies legislatively mandated by the National Historic Preservation Act of 1966 (as amended) with its Section 106 and 110 provisions. In Iowa, substantive new information on Mill Creek and its relationship to Great Oasis resulted from investigations at the Big Sioux phase Larson (13PM61) and Gytens (13PM60) village sites on Perry Creek (Henning 1982a, 1982b, 1982c, 1996) and later at the Great Oasis Cowan site (13WD88) on the Floyd River at Sioux City (Lensink and Tiffany 2005a, 2005b). Excavations conducted as part of flood mitigation at the Little Sioux phase Phipps site (13CK21) (Fishel 1995a, 1996) also resulted in a reanalysis of Mill Creek midden formation.

In 1973–1974, the University of Nebraska and Sanford Museum under the auspices of the U. S. National Park Service conducted survey and intensive testing at sites on Perry Creek, a tributary of the Big Sioux River, under the supervision of Dale Henning as part of a planned reservoir project (Henning 1980a, 1982a, 1982b, 1982c, 1996). The discovery of both Great Oasis and Mill Creek materials, particularly ceramics, believed to represent a single component at the Larson (formerly Larsen) site (13PM61), led Henning to propose a Perry Creek phase of conjoined Great Oasis and Mill Creek occupations (Henning 1996). This assessment offered a hypothesis contrary to the view that Mill Creek and Great Oasis were contemporaneous yet separate communities which on occasion had coexisted within close geographic proximity to one another but with little to no interaction (Henning 1981; Henning and Henning 1982). Such an interpretation was based on the earlier investigations at the Broken Kettle (13PM1) and Broken Kettle West (13PM25) village sites, just a few hundred meters from one another. It also ran contrary to the proposal by Peterson (1967a) that Great Oasis evolved into and ended with Mill Creek in northwest Iowa.

Stage 5, 1980s to present: Revisions, Reanalyses and New Directions

Over the past thirty years, most Plains village research beyond Iowa has been dominated by that conducted in the Knife-Heart region of North Dakota by Donald J. Lehmer and W. Raymond Wood along with graduate students from the University of Missouri (Johnson 2007b:11; Lehmer 1971; Lehmer et al. 1978; Wood 1986). This work has primarily addressed developments of the later Middle Missouri tradition (Extended and Terminal variants) and the Coalescent tradition, none manifest in Iowa.

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Initial Middle Missouri variant studies, have focused on refinements to taxonomy and chronology (Ahler et al. 2007; Henning 2001; Henning and Henning 1978; Henning and Toom 2003; Johnson 2007b; Lensink 1993b, 1997, 1998; Lensink and Tiffany 2005a, 2005b; Tiffany 1982a, 1983, 2007a; Toom 1992a, 1992b, 2004; Wood 2001) and the origins and development of the Initial variant and relationship between its member units (Alex 1981a; Johnson 1991; Gibbon 1991; Tiffany 1982a, 1983; Toom 1992a, 1992b). Reanalyses of existing data along with new research have resulted in altered interpretations concerning the relationship between climate and culture change (Laird et al. 1996, 2003; Lensink 1993a; Tiffany 1982a; Zalucha 1982a), the applicability of radiocarbon dating (Baerreis and Alex 1974; Butzer 1973; Lensink 1992, 2003a, 2003c), and possible sociocultural processes that brought about these first Plains villagers and that explain their interactions with Middle Mississippian communities, and their ultimate demise (Anderson 1987; Benn and Green 2000; Finney 1993; Henning 1971a, 1996, 2007; Henning and Henning 1978; Henning and Toom 2003; Lensink and Tiffany 2005a, 2005b; Tiffany 1982b, 1987, 1991a, 1991b, 2003b; Tiffany and Alex 2001; Tiffany et al. 1998; Toom 1992b; Wood 2001).

In 1981, Alex defined the Lower James phase to include the South Dakota Mitchell, Bloom, Twelve Mile Creek, and Goehring sites, emphasized their relationship to Mill Creek, and underscored their place in the Middle Missouri tradition (Alex 1981a). Tiffany (1982a, 1983), revised the Initial Middle Missouri taxonomy to incorporate Mill Creek and related sites into a modified version of the classification developed by Lehmer (1971). He proposed a model whereby the Mill Creek variant (Mill Creek and related sites) and the Chamberlain variant (related sites on the Missouri River) were assigned to an Early *period* of the Middle Missouri tradition, and argued authoritatively for placing Little and Big Sioux phase sites within the tradition (Tiffany 1983). Following the Willey and Phillips (1958) convention, Little Sioux phase sites were defined within the context of a region, called the Little Sioux locality, and similarly, the Big Sioux phase was assigned to a Big Sioux locality (Tiffany 2003a). Toom later defined eastern and western geographical divisions or variants of the Initial Middle Missouri, expanding upon an earlier differentiation (Henning and Henning 1978; Toom 1992a, 1992b). All Initial Middle Missouri sites along the Missouri River, are today grouped into five member phases (Anderson, Cattle Oiler, Sommers, Grand Detour, and Swanson) forming the western division. Eastern division phases include the Lower James, Brandon, Cambria, Little Sioux, and Big Sioux phases (Tiffany 2007a). Henning has also argued for the inclusion of a Great Oasis phase in the Initial Middle Missouri (2001), and with Toom (Henning and Toom 2003; Toom 2004) has suggested removing the Cambria phase. The abbreviation "IMMTe" refers to the Initial variant of the Middle Missouri tradition, eastern division: this includes all the Mill Creek culture sites.

Additional research on Great Oasis sites in northwest Iowa including Cowan (13WD88) on the Floyd River at Sioux City (Lensink and Tiffany 2005a, 2005b), and collections from sites on the Des Moines (Tiffany and Alex 2001), reinforce the solid consensus that Mill Creek was an *in situ* development, and that late Woodland communities, specifically Great Oasis, were ancestral (Henning 2007; Henning and Toom 2003; Lensink and Tiffany 2005a, 2005b; Tiffany 2007; Tiffany and Alex 2001; Toom 1992b, 2004; Wood 2001). Related sites along the Missouri River are also viewed as stemming from a local,

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generalized Late Woodland base although Toom has argued that early sites were the result of a migration of Initial variant peoples from the Lower James, Big Sioux, and Little Sioux phase communities (Toom 1992b). Still debated is the classification of Great Oasis as either an early member of the Initial Middle Missouri variant or as a terminal Late Woodland culture (Benn and Green 2000; Henning 2005, 2007; Lensink and Tiffany 2005a, 2005b; Tiffany 2007a; Tiffany and Alex 2001).

Recent recalibration and analysis of radiocarbon dates indicate a shorter time span for the Mill Creek culture and other Initial variant sites suggesting to some researchers that some communities formerly thought to have an antecedent–developmental relationship are likely contemporary, and calling into question the use of radiocarbon to date both site duration and periods of rapid culture change (Ahler et al. 2007; Lensink 1993a, 1997, 1998; Toom 1992b). In Iowa, these considerations have had perhaps the most profound effect on assessing the relationship between Great Oasis, Mill Creek, and Mississippian communities. Numerous publications have debated whether or not some Great Oasis peoples coexisted contemporaneously with Mill Creek (Henning 1991, 1996, 1998; Lensink and Tiffany 2005a, 2005b; Tiffany and Alex 2001; Tiffany et al. 1998). Use of ceramic cross dating and diagnostic artifacts has provided one way to resolve chronological issues and to correlate developments between Mississippian and Plains village cultures and among Middle Missouri communities themselves (e.g., Alex 1981a; Anderson et al. 1979; Anderson and Tiffany 1987; Anfinson 1997; Lensink and Tiffany 2005a, 2005b; Hall and Hall 2003; Johnson 2007b; Ludwickson et al. 1993; Tiffany 1991a, 1991b; 2003a, 2003b, 2007a; Tiffany and Adams 1998; Tiffany and Alex 2001). Recent source analyses (Fishel 1995b; Fishel and Titcomb 2009) offer specific avenues of research both to cross date and trace interactions between communities. Such studies have only minimally been applied to Mill Creek materials although ceramic thin sectioning of Mill Creek sherds found at Late Woodland sites has shown the potential of this technique (Henning 2007; Stoltman 1991).

While there is a solid consensus that Mill Creek and other early Initial variant sites were an outgrowth of local, resident cultures that coalesced into permanent, fortified, horticultural villages around A.D. 1100 (Henning 1971a; Tiffany 2007a; Tiffany and Alex 2001; Wood 2001) the sociocultural processes leading to these events and the relationship between communities remain a part of ongoing research. Anderson suggested a series of five factors or prime movers as part of a developmental model for Mill Creek: climate change; Mississippian contact; decline of Cahokia; contact among Initial Middle Missouri communities in South Dakota; and Oneota expansion (Anderson 1987:530—531). In light of a shorter chronology and more recent findings these factors are undergoing reassessment (Ahler et al. 2007; Tiffany 2007a). Studies of large mammals from deep sites including Kimball Village (Lensink 1989, 1990, 1991a) together with floral analysis of Mill Creek sites (Zalucha 1982a) and evidence from freshwater diatoms (Laird et al. 1996, 2003), for instance, have called into question the climatic model of Bryson and Baerreis and the role (or at least the nature) of climatic change as a prime mover in the origin of the Initial variant. Likewise, the droughty conditions, once thought to have precipitated an exodus of Mill Creek villagers from Iowa prior to A.D. 1300, now also seems unlikely (Henning 2007). Humanly-induced resource depletion and inter-

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societal conflict are now posited to have been factors in both the Mill Creek settlement model and the disappearance of Initial variant communities from Iowa's archaeological record (Lensink 1989; Tiffany 1983). While there is no question that Initial Middle Missouri communities, particularly those in Iowa, were in contact with the Mississippian world, researchers are exploring the nature of this interaction and its transformative effect on the evolution of Plains village society itself (Tiffany 2007a). It is within the rich artifactual assemblages of these communities that clues may be found to the ideational systems of these early communities. As Fugle's (1957) early study of Kimball and Broken Kettle village assemblages exemplified, within the iconography displayed on ceramic, shell, bone, and pipestone artifacts is the basis for understanding the ideational systems of early Plains village societies.

While a number of Big Sioux phase mortuary locations were recorded over the past thirty years, excavation in the Big Sioux locality was confined to rescue of burials accidentally uncovered at several sites, including Spirit Knoll (13PM248) a large ossuary/cemetery adjacent to the Kimball Village, limited field school excavations at Broken Kettle site (Doershuk et al. 1999), and minimal testing at Kimball Village in preparation for this Multiple Property Document (Whittaker 2010). Likewise, only limited excavation occurred at sites in the Little Sioux locality during this same period (Alex and Lensink 1996; Lensink and Alex 2006a). Beyond Iowa, field research of Initial variant sites has been confined primarily to cultural resource management studies and exploration of outlier sites with some degree of relationship (Alex 1989; Johnson 1993; Johnson 2007). Nondestructive techniques applied to both Little Sioux phase sites (Alex and Lensink 2001; Goodmaster 2007a, 2007b; Lensink and Alex 2008) and recently to Kimball Village (Kvamme 2009) have produced outstanding views of intact subsurface features suggesting exciting directions for future field research that may verify and identify buried features including existing houses and defensive systems. When combined with more recent estimates of house and village size (Lensink 2003a; Lensink and Tiffany 2005a, 2005b) and a shorter chronology, it is possible to more accurately estimate Initial Middle Missouri population density and community patterning (Toom 1992a).

The origin and development of nucleated, fortified, and permanent villages, the hallmark of the Initial variant itself, rests on intensive maize production first in evidence among Great Oasis communities (Lensink and Tiffany 2005a, 2005b). The recent documentation of the only known agricultural field system on the Prairie-Plains border at a Little Sioux phase site (Gartner 2003; Lensink and Alex 2008) together with recent paleo-ethnobotanical studies (Adrain 2003; Jones 1993; Nepstad-Thornberry 1998) and soil analysis (Plummer 2006) offer new prospects for understanding the economic system of Initial variant communities upon which societal reorganization took place.

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Historic Context : Big Sioux Phase, A.D. 1100–1250

There are at least two potential contexts. The *Big Sioux phase, A.D. 1100–1250* context is fully developed and discussed herein. The *Little Sioux phase, A.D. 1100–1250* context should be developed at a later date, and is briefly discussed in Section H.

Big Sioux Phase, A.D. 1100–1250

The Big Sioux phase historic context is discussed according to ten topics, each considered integral to the definition of the context. It is certain that sites of the Big Sioux phase have a high potential to provide information related to these important topics and references to them are made within the historic context development, in this format (Topic #). At the end of this discussion, a series of topical research questions are presented.

1. Origins of the Plains Village pattern;
2. Interaction between climate and culture;
3. Nucleation and fortification of communities;
4. Establishment of tribal identities;
5. Expansion and intensification of Mississippian contact and influence on the Prairie Peninsula;
6. Ceramics and food: storage, consumption, and ceremonialism;
7. Artifacts as reflections of ideological systems
8. Length of occupation and duration of early MMT communities
9. Intensification of agriculture; and/or
10. Prehistoric landscape.

A Big Sioux phase has been a recognizable archaeological entity (definable in space, time, and content) to Midwestern and Eastern North American scholars since at least the 1930s by which time it had been identified and classified as one of two recognizable cultural subdivisions in northwestern Iowa called the Big and Little Sioux foci (later, called phases) (Griffin 1935; Ives 1962; Keyes 1927, 1935a; McKern 1939). Together these two comprised the Mill Creek culture, first defined and named by Charles R. Keyes after Mill Creek, a tributary of the Little Sioux River where sites were well represented (Keyes 1927). The characteristically rich midden mound villages found at Big Sioux phase sites like Kimball (13PM4) and Broken Kettle (13PM1) attracted the attention of collectors and archaeologists for well over a century, and have made Mill Creek one of the most investigated prehistoric archaeological manifestations in Iowa (see above and Section H).

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Geographical and Chronological Range

Big and Little Sioux phases belong to the Initial variant (formerly horizon) of the Middle Missouri tradition (IMMT). The Middle Missouri Tradition (MMT) itself represents an archaeologically-defined manifestation on the northern Plains that spans a 400-year period of Native American history (A.D. 1100–1500) (Ahler et al. 2007). The MMT is one of three broad cultural traditions, along with the Central Plains and Coalescent traditions, of the Plains Village pattern (Lehmer 1954, 1971). The Big Sioux phase of the IMMT dates to 1100-1250 A.D.

Both Big and Little Sioux phases are linked to eight (Tiffany 2007a) other member phases of the IMMT (see Figure 1) by a constellation of traits relating to settlement, economy, and technology (see history of investigations presented earlier). Most closely allied are sites of the Lower James phase in southeastern South Dakota (Alex 1981a). Related sites along the Missouri River trench form the western geographical division of the IMMT with the Big and Little Sioux phases placed within an eastern geographic division (Henning and Henning 1978; Toom 1992a, 1992b).

Currently, 48 IMMT sites in northwestern Iowa are recorded in two discrete localities (Big and Little Sioux localities) (Figure 3). Big Sioux phase sites are currently known from six villages and eight separate mortuary facilities (in addition, three of the villages contain mortuary facilities) dispersed over a 17 x 9 km area (Fishel 1995a:69) in the valley of the Big Sioux and three of its tributaries: Broken Kettle, Joy, and Perry creeks, in Woodbury and Plymouth counties in the Loess Hills of western Iowa (Prior 1991) (see Figure 3; Tables 1 and 2).

Table 1. Big Sioux Phase Village Sites.

Site	Site Name	Estimated acres (hectares)
13PM1	Broken Kettle*	1.10 (0.44)
13PM3	Kimball*	1.90 (0.77)
13PM7	Joy Creek Major	0.84 (0.34)
13PM60	Gytens	3.54 (1.41)
13PM61	Larson*	9.01 (3.65)
13PM429/WD105	(unnamed)	1.22 (0.49)

* also considered a mortuary facility

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Table 12. Separate Big Sioux Phase Mortuary Facilities.

Site	Site name	Isolated burials, cemetery, or within village
13PM23	Kimball Burial Site	Cemetery
13PM36	Belle Vista North	Isolated
13PM37	Belle Vista South	Isolated
13PM65	Rock Creek Ossuary	Cemetery
13PM127	Ossuary #2	Cemetery
13PM172	(unnamed)	Cemetery
13PM248	Spirit Knoll	Cemetery

The context's beginning and end dates, A.D. 1100 and 1250, refer to radiocarbon dates which represent the earliest and latest known IMMT occupations in the State of Iowa (Lensink 1993b, 1997, 1998). Calibrated radiocarbon dates and cross-dating by ceramics and other diagnostic artifacts including trade items ("horizon markers"), provide ways to date Big Sioux phase sites. Together they suggest a time span of 150 years, A.D. 1100–1250, for the occupation of both the Big and Little Sioux localities. The Larson (13PM61) and Gytens (13PM60) sites placed here within the Big Sioux phase, may represent the rapid transition to Mill Creek from antecedent Great Oasis as suggested by the presence of both Mill Creek and Great Oasis materials (Henning 1996; Lensink 1992, 1997; Lensink and Tiffany 2005a; Tiffany 2007a). Taken together with evidence presented below regarding the indigenous origin of Mill Creek from local Late Woodland populations including Great Oasis, the Big Sioux phase sites offer the opportunity to explore in depth the processes leading to (Topic 1) the origin of the MMT and the Plains village pattern.

Major excavations conducted at three Big Sioux phase villages alone, Kimball (13PM4), Broken Kettle (13PM1), and Larson (13PM61), and items recovered from the Siouxland Sand and Gravel burials (13WD402), have provided Mississippian horizon markers in the way of pottery and trade items characteristic of the Lohmann and Stirling phases found at the World Heritage Site, Cahokia, A.D. 1050–1200 (Tiffany 1991a, 2007a). As such they represent the potential of the Big Sioux phase sites to provide significant information relating to (Topic 5) the expansion and intensification of Mississippian contact on the Prairie-Plains.

Settlement and Community Pattern: "many sites and few people"

Mill Creek sites in general occur on river or creek terraces, although residents avoided broad, flat, treeless valleys, such as the Floyd. Factors affecting the location of sites were likely the availability of water, tillable soil, large game animals, and timber (Tiffany 1982a:11). Big Sioux phase village sites, as demonstrated from excavations at Broken Kettle (13PM1) and Kimball (13PM4), typically occur as stratified earthen midden mounds. Village sites reflect relatively small (.4 ha), compact, nucleated settlements containing upwards of ~20 houses (Whittaker 2010).

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Overall, Mill Creek houses have a mean size of 41.4 square meters (Lensink 2003a; Lensink and Tiffany 2005a, 2005b). Kimball Village produced house dimensions of 6 by 9 m or more. Houses were rectangular, wooden post structures, with entrances at one end, subfloor storage or cache pits within and between houses, and central hearths (Figure 4). The size and dimension of houses have implications for social organization with large, extended families likely occupying them. The post-mold pattern suggests walls were held up by vertical timber posts set in individual post holes. Some houses appear to have been banked or covered by earth, partially accounting for the accumulation of soil composing the earthen mounds (Baerreis and Alex 1974; Fishel 1995a), although other hypotheses have been proposed (Lehmer et al. 1973). Digging of pits, rebuilding of houses, and shifting midden areas, also may have added to the deposits. In such instances, two or three short occupations at a site could account for the production of thick midden mounds. Probably a combination of these factors explains the accumulated deposits at village sites like Kimball and Broken Kettle (Anderson 1985b, 1986; Fishel 1996).

Kimball Village, like ones in the Little Sioux locality, displays evidence that houses were regularly arranged, suggesting community planning (Figure 5). Big Sioux phase structures may also have been semisubterranean with wattle and daub walls as is found at other IMMT sites. Thatch or other plant material used in house construction is also reported (Alex 1981a; Tiffany 1982a; Orr 1942).

Village fortifications consisting of ditches and wooden post palisade defenses are typical of most IMMT sites including at least six Little Sioux phase sites (Figure 6). The defensive features at the Double Ditch site (13OB8) in O'Brien County included two 4 meter-wide, parallel ditches (Gartner 2003; Lensink 1994b, 1995). Recent geophysical research at the Big Sioux phase Kimball Village suggests the possibility of a palisade surrounding upwards of 20 houses although evidence for the presence of ditches was inconclusive (Kvamme 2009) (Figure 7). Plowing and other kinds of disturbance over the past century probably obliterated evidence of fortifications at many sites. Recent geophysical survey has been successful in recovering subsurface features such as surrounding defensive ditches and palisades, as well as houses whose surface footprint has been destroyed by plowing (Whittaker 2010). This holds promise for better defining community layout at other Big Sioux phase sites such as Larson, Broken Kettle, and 13PM429/WD105.

Excavation of large midden mounds demonstrating the superposition of house floors, together with radiocarbon data from sites like Kimball and Broken Kettle villages, led earlier archaeologists to hypothesize IMMT sites were occupied over very long periods of time, 500 years or more (Bryson and Baerreis 1968). Reanalysis and recalibration of radiocarbon dates has shortened this chronology making it untenable that villages lasted for hundreds of years (Lensink 1997; Lensink and Alex 2008). Historic Plains lodge-dwellers such as the Hidatsa and Omaha peoples maintained similar houses for 10 to 20 years before they were abandoned. A recent study suggests that no IMMT village in Iowa was occupied longer than 69 ± 13 years (Lensink 2003a).

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A number of interpretive settlement models have been proposed for eastern IMMT sites including those in Iowa, based on varying lines of evidence including ceramic seriation (Alex 1981a; Anderson 1981; Flanders 1960; Tiffany 1982a; Vis and Henning 1969). Anderson proposed that only a few primary Mill Creek villages were occupied at any one time, with "budded" villages occasionally established (Anderson 1972, 1987; Tiffany 1991a:319). A suggested IMMT population in Iowa, based on the estimated 150-year duration, may have totaled 1,000 to 1,375 people at any one time, with one to two contemporaneous villages in each locality, and some settlements abandoned and then reoccupied (Tiffany 1982a, 1991a, 2003a, 2007a; Lensink 2003a). Similar results are reported for the western IMMT leading to the suggestion that the IMMT settlement pattern reflects "many sites and few people" (Toom 1992a). Recovering additional datable organic materials from carefully excavated stratified sites like Kimball and extant deposits at Broken Kettle to better refine the radiocarbon chronology, together with stylistics studies and cross-dating of ceramics (e.g., Fishel 1995a) could assist refinement of the IMMT sequence in Iowa and help to determine the occupation and duration of settlements, as well as the relationship among individual sites (Topic 8).

Refining details of settlement and community pattern within the Big Sioux locality has implications for elucidating the processes leading to nucleation and fortification (Topic 3), and the establishment of tribal identities (Topic 4) on the eastern Plains. Current site types and the potential for the discovery of new ones (fish weirs, agricultural fields) may also allow archaeologists to define the nature of the "domesticated landscape" (Roper 2007) as used and shaped by Mill Creek people (Topic 10).

Subsistence

The recovery of abundant remains of butchered animal bone and shell, and carbonized seeds and other plant materials demonstrate that Big Sioux phase village residents, like other members of the IMMT, subsisted on an economy of large mammal hunting and intensive horticulture (maize as the major element), with the gathering of wild plants and utilization of smaller animals adding to subsistence based on an annual cycle (Adrain 2003; Bryson and Baerreis 1968; Dallman 1977, 1983; Frankforter 1969; Johnson 2007a, 2007b; Henning, 2007; Tiffany 2007a). Bison, deer, and elk were the most important large game animals hunted by IMMT peoples in terms of usable amounts of meat, although the primacy (in terms of number of individuals) of either deer or bison varied from site to site and within sites over time (Dallman 1983; Jans-Langel and Fishel 1995a; Lensink 1993a; Powell et al. 2009). These patterns, once thought to reflect environmental change, may be related to (1) the external contacts of Mill Creek people and to the role that bison products played in the trade with Mississippian societies to the east (Tiffany 1987, 1991a), (2) human-induced changes in the local ecology (Lensink 1990, 1991a; Lensink and Finney 1994), (3) techniques of data analysis (comparing minimum number of individuals versus number of identified specimens) (Dallman 1983), (4) a variety of unexplored ecological and cultural factors including prey population cycles and migrations, and changes in human procurement patterns not reflected in the faunal record. While large ungulates (cud-chewers, like bison) dominate the faunal record, smaller mammals including the plains pocket gopher, beaver, dog, and various rodents, birds, turtles, abundant fish remains particularly species of catfish and suckers, and freshwater mussels were regular supplements to the Mill Creek diet (L. Alex 1973; Dallman 1983; Fugle 1957; Jans-Langel and Fishel 1995; Powell et al. 2009; Warren 1996).

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Big Sioux phase villages including Kimball, Broken Kettle, and Larson, like other IMMT sites, reflect an economy reliant upon intensive maize horticulture. Large cache pits are found beneath house floors and between houses, and abundant instances of corn were noted even before modern paleoethnobotanical studies (Orr 1942). Corn and goosefoot seeds dominate the crop assemblage at Little Sioux phase sites with domesticated sunflower, gourd/squash, beans, tobacco, and sumpweed identified by recent studies (Adrain 2003; Asch 1992; Jones 1993; Nepstad-Thornberry 1998; Wegner 1975, 1979; Zalucha 1982a, 1982b). This same research demonstrates the wide variety of wild plants including erect knotweed, little barley, and maygrass (plants of the Eastern Agricultural Complex), which may be domesticated, as well as bulrush, plum, sumac, ground cherries, various berries, bearberry, and nuts such as black walnut and hazelnut utilized by IMMT people in Iowa. The comprehensive study of extant Big Sioux phase paleobotanical samples using enhanced techniques, such as scanning electron microscopy (e.g., Jones 1993), and the careful recovery of new samples collected via water flotation, could result in better estimates of domestic versus wild species, a more accurate determination of seasonality, and a better understanding of the level of agricultural intensity (Topic 9).

Most Big Sioux phase gardens are assumed to have been situated along the bottomland of streams near the village locations themselves. The recent documentation of an agricultural field system on an upland terrace associated with a Little Sioux phase site (Gartner 2003; Lensink and Alex 2006a, 2006b, 2008), indicates that IMMT farmers utilized other landforms to enhance crop productivity. Although destroyed by modern plowing, field systems in other locales may be considered to have once been a regular part of Mill Creek agriculture (Topic 9) and an integral part of the IMMT prehistoric landscape (Topic 10).

Material Culture

Big Sioux phase sites, like other IMMT villages, produce enormous quantities of largely grit-tempered pottery, ground and chipped stone tools, chipped stone flaking debris, bone and shell implements, fire-cracked rock and items of personal adornment (Fugle 1957; Henning 1996; Orr 1942). Nonceramic items include small triangular notched and unnotched projectile points (mostly for arrows), knives, endscrapers, drills, grooved mauls, celts, abraders, stone balls, pipes, and discoids. The byproducts of hunting were translated into a wide variety of bone and antler tools ubiquitous at Big Sioux phase villages such as fleshers, hide grainers, shaft straighteners, hoes, knives, sickles, flaking tools, awls, beamers, fishhooks, and so-called quill flatteners. The fine bone needles and pointed awls of bison or bird bone were commented on by the earliest investigators at sites such as Broken Kettle (Stafford 1906). Also common are shell (freshwater and marine) and bone beads and other adornment (Fugle 1957; Orr 1942) (Figure 8).

Ceramics exhibit varied surface treatments with flared and S-shaped rims decorated with tool impressions, crosshatching, and geometric designs using trailed lines or twisted cords. Big Sioux phase potters manufactured a wide variety of characteristic vessels including wide-mouthed, sub-globular jars or ollas,

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bowls, "seed jars," hooded water bottles, and miniatures. These ceramics have been classified into four major wares: Sanford (low rim), Chamberlain (high rim), Foreman (s-shaped rim), and Mill Creek (Ives 1962). Except for Mill Creek ware, each ware is distinguished primarily on the basis of a flaring or S-shaped rim form, with specific types defined largely by exterior lip and rim decoration. Mill Creek ware (formerly the Mill Creek group) consists of four different and distinct vessel types believed to have been inspired by Middle Mississippian forms. Sanford, Chamberlain, and possibly Foreman ware types have antecedents in earlier Great Oasis types. Mill Creek ceramic decoration typically includes incised geometric patterns such as triangles, rectangles, and diamonds, or horizontal bands of trailing applied to the shoulders. Other motifs include the so-called running deer or flag and dot, turkey track, and weeping eye. Carinate vessels with single lugs at the shoulder, curvilinear designs, rolled lips, and red slip are believed to represent Mississippian inspirations. Some pots have loop or effigy handles representing small mammals and birds (Figure 9).

While the Iowa IMMT communities, like those on the Big Sioux, share the same general ceramic tradition with related IMMT elsewhere, there are differences in the frequencies of the major ceramic types and how the pottery was decorated. Big Sioux and Little Sioux phase sites, as an example, have less than 1% cord-impressed decorated rims with horizontal-trailed line decoration taking its place. The incidence of cord-impression rises at sites outside of Iowa and is highest at IMMT sites on the Missouri River proper. Big Sioux phase villages as demonstrated at Kimball, Broken Kettle, and Larson, may have as much as 20% or more of the ceramic assemblage composed of pottery reflecting Mississippian influences (Tiffany 1983:95). This includes shell tempering, rolled lips, bowls, bottles, seed jars, and scroll decoration on vessel shoulders. These ceramic differences form important criteria for the subdivision of the IMMT into eastern and western divisions, for understanding exchange and interaction, and for studies related to societal makeup and possibly residential patterns of IMMT communities (e.g., Fishel 1996). Recent research estimating the size, volume and quantity of ceramic vessels (Resnick 2009) coupled with similar studies on storage pits (Lensink 1988b) provide one direction that future research at existing Big Sioux villages can take in understanding IMMT food: storage and consumption (Topic 6).

The rich material culture of Big Sioux phase sites provides evidence for the range of domestic, technological, and economic innovations carried out by these early Plains villages. In addition, non-local freshwater and marine shell beads and pendants, carved antler, bone pins and beads, ceramic and bone earspools, and a variety of teeth including those of bear, dog, and beaver represent items of adornment or ceremony. Decorative elements including effigy handles, designs found on some ceramic vessels, ceramic and stone pipes (Lensink 2003b), and the finely engraved vessels and masks from the Siouxland Sand and Gravel site are also highly suggestive of ceremonialism (Anderson et al. 1979; Anderson and Tiffany 1987). Such items have the potential to extend an understanding of the ideological systems of these early Plains village societies, especially when combined with ethnohistoric studies of later descendant peoples (Topics 6, 7). Using recent material source analysis (Fishel and Titcomb 2009) future scholars have the technological tools to trace both the direction and the inspiration for such items and ideas (Topic 5).

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Burials

Although Mill Creek burial patterns are not well known, accidental discovery of at least eight separate Big Sioux phase mortuary locations and individual burials and human remains found within three villages represent the largest sample of known mortuary facilities for the entire IMMT. These sites include cemeteries, ossuaries, and single and multiple interments within villages. Excavations at both Kimball and Broken Kettle villages confirm the presence of human remains within the village proper, as is also known from sites on the Little Sioux. The recovery of disarticulated human remains scattered in house fill and storage pits, and child burials in middens and pits seem common traits among Plains village groups, and mound burial is also reported (Alex 1971, 1988; Tiffany 1982a:5). Known cemeteries and ossuaries occur within view of and above, major Big Sioux phase village sites (Anderson and Baerreis 1973; Anderson et al. 1979; Lilly and Banks 1965a, 1965b; Lillie 1990c, 1996, 2002c, 2002d, 2004a; Orr 1942). Anderson and Baerreis (1973) pointed out that the few grave goods with ambiguous cultural origin associated with these burials make cultural affiliation tentative. This is exemplified at the Big Sioux phase Spirit Knoll site (Shirley Schermer and Robin Lillie personal communication), Rock Creek ossuary, and Siouxland Sand and Gravel site (Anderson et al. 1979). However, the discovery of certain items including ceramics and a marine shell masquette at the latter site allude to a definite Mill Creek affiliation. While studies of ancient human remains like those known from Big Sioux phase sites must be carried out within the constraints of protective legislation and with the consultation of descendant communities, they have the potential to help in determining the tribal identities of Mill Creek people (Topic 4) and the relationship among IMMT populations and others on the eastern Plains.

Climatic Change

The University of Wisconsin-Madison's 1963 research in northwest Iowa was a landmark study of Mill Creek and established a model of climate and culture change which dominated Plains village research for decades (Bryson and Baerreis 1968; Bryson et al. 1970; Lehmer 1970; Wendland 1978). Initial critiques surfaced early (Butzer 1973; Dallman 1983), and in light of a recently suggested shorter chronology and additional findings, the original conclusions and resulting hypotheses of this model have undergone reassessment (Ahler et al. 2007; Tiffany 2007a). Studies of large mammals from deep sites including Kimball Village (Dallman 1983; Lensink 1989, 1990, 1991a) together with floral analyses (Zalucha 1982a) and evidence from freshwater lake diatoms (Laird et al. 1996, 2003) have called into question the original tenets of the climatic model. These and more recent research (Adrain 2003; Jones 1993) offer the potential to examine the role (or at least the nature) of climatic change as a prime mover in the origin of the IMMT as well as to refine understanding of the seasonal use of resources (Topics 1, 2). The possibility of a prolonged drought throughout northwest Iowa from A.D. 1000 to 1200, which covers the time period when the IMMT appeared, with a shift back to wetter and cooler conditions after A.D. 1250, is the opposite of that originally proposed (Tiffany 2007a:10). Humanly-induced resource depletion, inter-societal conflict, trade and the relationship with Mississippian communities are now posited as factors in both the Mill Creek settlement model and the disappearance of IMMT communities from Iowa's archaeological record (Lensink 1989; Tiffany 1983, 2007a).

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Contact and Exchange

Many artifacts found at Big Sioux phase sites reflect the wide-ranging contacts these northwest Iowa communities had with other peoples. Ceramic evidence alone, shows interaction with some Late Woodland groups in eastern Iowa (Benn and Green 2000; Tiffany 1982b) southwestern Wisconsin (Finney 1993; Finney and Stoltman 1991), Nebraska phase groups in southwestern Iowa (Billeck 1993), and Caddoan groups (Anderson and Tiffany 1987). These are in addition to more obvious ties to other IMMT communities in Iowa and South Dakota, and the Cambria phase sites of southern Minnesota (Gibbon 1993; Henning and Toom 2003; Knudson 1967; Scullin 2007). The similarities between Mill Creek and Lower James phase sites in southeastern South Dakota suggest that these communities were closely related and frequently in contact. Resources from the Plains, including bison and certain lithics, are common at Iowa sites. There is no local bedrock source for the stone tools made by Big Sioux phase peoples. Many tools were fashioned from materials extracted from local glacial till or stream and river gravels. However, the presence of large pieces of Knife River flint and Bijou Hills silicified sediment point to trade or to direct procurement from locations in North and South Dakota. Certain specific raw materials and diagnostic artifact types also suggest a strong eastern exchange network. Burlington and other cherts and chalcedonies derive from sources in central and southeastern Iowa. In southwestern Iowa, Mill Creek pottery or local imitations are reported on early Nebraska phase sites in the Glenwood locality (Billeck 1993:124–125; Green ed. 1992; Ives 1955), and in sites of the Itskari and St. Helena phases of northern Nebraska (Blakeslee 1988:6). Late Woodland sites in Allamakee County including Hartley Fort, Waterville rockshelter (13AM124), and Sixteen rockshelter (13AM122) (Logan 1976; Orr 1963; Tiffany 1983, 1991a); sites of the Eveland phase of the Spoon River culture in the central Illinois valley (Conrad 1991; Harn 1991; Tiffany 1991a), and the Diamond Bluff site in western Wisconsin contain Mill Creek ceramic imports. Hartley Fort pottery also occurs at one Little Sioux phase site and at the Fred Edwards site in Wisconsin (Finney and Stoltman 1991:243; Stoltman 1991; Tiffany 1991a:320).

Nonlocal materials, particularly stone, pottery and shell, from both Big Sioux phase village and mortuary sites demonstrate perhaps the strongest external relationships with Mississippian communities to the east and south during the period of A.D. 1100–1200 especially the Stirling phase at Cahokia (Hall and Hall 2003; Tiffany and Adams 1998) (Figure 10). The location of the Big Sioux phase villages near the confluence of the Big Sioux and Missouri River was likely strategic and related to trade. As Henning (2007:71) has suggested, “Judging from available data, there can be little doubt that the preeminent traders of the eastern Plains were residents of Mill Creek villages. No other cultural tradition on the Plains is so well represented in the Mississippi valley at this time.” Recognition of this connection was established with the first scientific research on Big Sioux phase sites in the 1930s, and factored into ideas concerning the origin of Mill Creek itself (Griffin 1935, 1967). Tri-notched projectile points similar to Cahokia points occur alongside the more typical Plains side-notched forms. Artifacts found at Kimball, Broken Kettle, Larson, and Siouxland Sand and Gravel, such as earpools, pulley-shaped stone or bone earrings; chunky stones; pipes; shell pendants; scalloped-edge shell gorgets; carved bone pins; shell tempered ceramics; *Leptoxis* shell (a freshwater variety from the Ohio River system) beads; and Gulf or Atlantic coast marine shell are common

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to Middle Mississippian sites including the metropolis of Cahokia itself. Iconography, displayed in the long-nosed god masks, like that found at the Siouxland Sand and Gravel site (Anderson 1975a, 1975b; Anderson et al. 1979), and ceramic design motifs such as the scroll or the weeping eye, imply a shared ideology with Mississippian societies.

Ceramics represent the most convincing case in favor of interaction. Imported Mississippian Powell Plain and Ramey Incised vessels, red-slipped seed jars, and polished bowls with finely ground shell temper occur at Big Sioux phase sites and suggest direct interaction with the American Bottom. Locally made copies of these Middle Mississippian pottery types comprise up to 20 percent of some Mill Creek ceramic assemblages. Thin section analysis of the paste and temper of Mill Creek sherds helps to distinguish between imported vessels and locally made copies (Stoltman 1989, 1991).

Today, understanding the nature of the interaction with Mississippian communities in terms of exchange and alliance networks, acquisition routes, the effect this interaction may have had on the formation and concentration of nucleated IMMT communities in close proximity to the Missouri River, and perhaps most importantly, the emergence of tribal society among intensive agrarian communities (Topics 4, 9) (Tiffany 2007a), remain preeminent topics of research within the broader topic of the expansion and intensification of Mississippian influence on the Prairie Peninsula (Topic 5). The Big Sioux phase sites provided some of the original data which led to the recognition of this broad east-west exchange network, and sites remain poised to provide significant new information on these important topics.

Origin

At one time researchers proposed that the Big Sioux phase communities represented the migration of Middle Mississippian people to northwest Iowa from the Mississippi Valley through sites such as Aztalan in Wisconsin and Cambria in Minnesota (Griffin 1967). However, information from the lower levels of deep midden deposits at sites such as Kimball Village had by the late 1960s demonstrated that the earliest Mill Creek occupations were contemporaneous with Mississippian developments at Cahokia and likely an outgrowth of local Great Oasis communities, not a migration of Mississippian peoples (Anderson 1969a; Henning 1967, 1969a, 1971a; Peterson 1967a, 1967b). Henning (1969a, 1971a; Henning et al. 1968) proposed that those local communities who adopted intensive corn agriculture and bison hunting became Mill Creek. Middle Mississippian characteristics as seen in later Mill Creek components pointed to contact with Cahokia via diffusion and trait unit intrusion (Henning 1969a; Willey and Lathrap 1967). Additional research at Great Oasis sites, recalibration of radiocarbon dates, and cross dating with ceramics and diagnostic artifacts demonstrate that some Mill Creek sites are as early as their supposed prototypes in the Mississippi Valley and developed from local cultures like Great Oasis. The close proximity of many Great Oasis sites to Big Sioux phase communities and additional research on Great Oasis sites in northwest Iowa (Lensink and Tiffany 2005a) reinforce a solid consensus among scholars that Mill Creek was an *in situ* development, and that late Woodland communities, specifically Great Oasis, were ancestral to it (Henning

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2007; Henning and Toom 2003; Lensink and Tiffany 2005a; Tiffany 2007a; Tiffany and Alex 2001; Toom 1992b, 2004; Wood 2001). Western IMMT sites along the Missouri River are also viewed as stemming from a local, generalized Late Woodland base although it is also argued that early sites here may represent a migration of Initial variant peoples from the Lower James, Big Sioux, and Little Sioux phase communities (Toom 1992b).

Most researchers agree that the origin of the MMT lies in the coalescence and transformation of loosely aggregated, Late Woodland (Great Oasis) farming communities into nucleated, fortified communities like the Big Sioux phase villages. Precipitating factors include intensive maize production, the expansion of bison herds to the eastern Plains border, and participation in a long-distance trade network with highly ranked Mississippian societies that began between A.D. 1050 and A.D. 1100. (Tiffany 2007a). The Big Sioux phase sites and nearby Great Oasis sites offer the opportunity to explore these processes and the evolution of this new way of life (Topics 1, 2, 3, 4, 5, 9).

Still debated is the position of Big Sioux phase sites like Larson which display assemblages of both Great Oasis and Mill Creek ceramics (Henning 1996; Tiffany et al. 1998), with the presence of Mississippian pottery styles characteristic of Lohmann phase components at Cahokia, which date A.D. 1050–1100. Henning has argued on the basis of radiocarbon dates that this site represents combined Great Oasis and Mill Creek people still in possession of older, Lohmann-style pottery (Henning 1996, 1998). Lensink has demonstrated that the vagaries of radiocarbon dating including the physics of C^{14} production and statistics of radioactive decay (Lensink 1998) produce an overlap in radiocarbon dates between Great Oasis and Mill Creek components, and thus cannot be used to determine either their contemporaneity or the transition of one to another. The presence of Lohmann-style Mississippian pottery and the absence of the later Ramey-style at sites like Larson, according to this argument, suggest their relatively early position and their status as communities rapidly transitioning from Great Oasis into Mill Creek (Lensink and Tiffany 2005a; Tiffany et al. 1998).

Exodus from Iowa

The Mill Creek abandonment of northwest Iowa, including the Big Sioux locality, was apparently underway by A.D. 1250. While some later IMMT sites in South Dakota may represent descendant communities (Toom 1992b), exactly why the Big and Little Sioux localities were abandoned at this time is unknown.

The earliest Oneota sites in northwest Iowa appear to postdate Mill Creek, but they may represent the eventual occupation of Oneota peoples following an extended period of hunting and raiding into Mill Creek territory (Lensink 1992:194; Ritterbush 2007). Another intriguing, though unsubstantiated, proposal suggests that some Mill Creek and other IMMT people were absorbed into the rapidly expanding Oneota world (Gibbon 1995:191). Previous interpretations about the existence and disappearance of Mill Creek society emphasized the role of climate (Bryson and Baerreis 1968; Dallman 1983; Henning, ed. 1968, ed.

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1969). More recently, however, reexamination of some of the earlier data as well as new studies have questioned the validity of the model and challenged the conclusions of the original research (Clark 1990; Laird et al. 1996; Lensink 1997; Zalucha 1982a). The movement of Coalescent peoples into the Middle Missouri region may have been a factor as was the decline of Mississippian culture and the potential disruption to trade (Henning 2007:71).

Later sites of the Middle Missouri tradition in South Dakota may best answer the question "Where did the Mill Creek people of the Big and Little Sioux phases go?" The IMMT may have evolved into some villages on the Missouri River recognized as the Extended variant of the Middle Missouri tradition (Johnson 2007b:110-111) or perhaps been partially incorporated into the Initial variant of the Coalescent tradition (Tiffany 2007b). Skeletal studies of Initial variant specimens in Iowa, although rare, suggest a relationship between individuals from the Big Sioux phase Broken Kettle site and the Initial Coalescent population at Crow Creek in South Dakota (Owsley et al. 1981). Other studies support a similarity between Initial variant individuals and a pooled "Mandan" group consisting of individuals from all Middle Missouri variant sites and the Heart River (Mandan) complex in North Dakota (Jantz 1976; Jantz and Willey 1983; Johnson 2007b:108).

Research Questions and Directions

The well-preserved stratigraphic horizons, lodge remnants, storage pits, activity areas, mortuary facilities, and richly diverse artifact assemblages from Big Sioux phase sites provide research opportunities into various Late Prehistoric topics, including origins of the Plains Village pattern, the interaction of climate and culture, nucleation and fortification of communities, tribal identities, contact and trade, ceramics and food, ideological systems, length and duration of the early MMT, intensification of agriculture, and prehistoric landscape. Timely research questions pertaining to the *Big Sioux phase, A.D. 1100-1250* context, arranged according to these topics, include:

Origin of the Plains Village pattern

- 1) What is the nature of the transition of Great Oasis to Mill Creek? Big Sioux phase sites are in the largest cluster of Great Oasis sites in the Midwest. Big Sioux phase sites are singular for examination of the apparent rapid transition from Great Oasis to Mill Creek locally and regionally. This can be tested and evaluated by ceramic assemblages and radiocarbon dates from house floors and pits in those floors primarily with data available in curated collections or attainable from further excavation.
- 2) Both a) the increasing success of agricultural reliance on domesticated corn, squash, and the North American small seed complex, and b) the rapid increase in trade relations with Mississippian centers during the Cahokian Lohmann phase, have been implicated as the exogenous variables for the appearance of the Plains Village pattern among eastern Initial variant sites like those of the Big Sioux phase. The Big Sioux phase and its associated Great Oasis sites offer the opportunity to address the question of which of these two variables was the more significant causative factor.

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Interaction between climate and culture

- 1) The climatic model of the 1960s has been thrown into question by more recent research. Is it possible to utilize paleoenvironmental data from Big Sioux phase sites and nearby Great Oasis sites to address the causative role of climate in the transition to nucleated village life?
- 2) The abandonment of the Big and Little Sioux phases remains largely uninvestigated. Did climate play a role in this abandonment?

Nucleation and fortification of communities

- 1) Recent geophysical survey has shown the potential to determine whether Big Sioux phase sites altered by cultivation display evidence of fortification. It is sometimes assumed that all or most Mill Creek sites were fortified. Data from geophysical survey at other Big Sioux phase villages clarifying whether these sites are fortified would allow the question to be addressed as to why some villages are fortified and others are not.
- 2) We currently have no conclusive evidence that any Great Oasis site was fortified. The transition from Great Oasis to Mill Creek appears to be a transition to tightly nucleated and fortified communities. Why did fortification become necessary with the establishment of the IMMT Big Sioux phase?
- 3) What does nucleation and fortification say about the emerging sociopolitical organization of Initial variant communities and their external contacts?

Establishment of tribal identities

- 1) Big Sioux sites have produced the bulk of documented human remains from Mill Creek sites. These data indicate an affiliation with Coalescent/Arikara populations and culture history and not the Extended to Terminal Middle Missouri tradition sequence of the Mandan in particular and Hidatsa in general. Could additional work conducted on the cranial data assembled from the Big Sioux phase Siouxland Sand and Gravel and Spirit Knoll sites be used to evaluate hypotheses concerning the affiliation of Initial variant skeletal materials with either the Coalescent or Middle Missouri descendant populations?
- 2) What are the factors that brought about the transformation of Late Woodland cultures from loosely aggregated band-level groups into weakly ranked tribal societies as evidenced by Big Sioux phase sites?
- 3) Corroborative material culture present in extant collections on the Anoka focus and St. Helena focus at the Nebraska State Museum should be fully reevaluated especially in light of the long-standing published observations on Grey Cloud Horizontal Incised, an Initial Coalescent variant pottery type with clear affinities to Great Oasis/ Chamberlain wares. Would such an analysis provide evidence for ceramic continuity from Mill Creek to Initial Coalescent (Tiffany 2007b; Caldwell and Jensen 1969)?

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Expansion and intensification of Mississippian contact and influence on the Prairie Peninsula

- 1) The Big Sioux phase sites are rich in evidence for Mississippian contact and influence. What is the nature of this contact?
- 2) Is there quantifiable evidence from Big Sioux phase sites to support Tiffany's (1991a) model of "meat for the elite?"
- 3) Utilizing new material sourcing techniques including ceramic thin sectioning, can the origin of non-local items found in Big Sioux phase sites be sourced thus offering clues to the direction and intensity of Mississippian contact and influence on the Prairie Peninsula?
- 4) Many of the research questions pertaining to Mill Creek and the Plains Village tradition generally deal with the contact and interaction among local and non-local peoples. There are few extant reports on Great Oasis, Mill Creek and Middle Missouri human skeletal remains, but there are data on Mississippian populations. Nevertheless, these data, and the results of recent data recovery at a Big Sioux phase cemetery (Spirit Knoll), could be thoroughly examined prior to reburial per Iowa law and NAGPRA consultation. Such analysis would (a) assist in answering questions regarding the relationship between Mill Creek populations and their likely precursors, (b) identify biological relationships among Mill Creek and other IMMT and Coalescent populations, and (c) determine potential affiliation with Mississippian peoples. Non-local individuals (e.g., Mississippians) may be identifiable using comparative cranial studies and stable isotope analyses. Results could provide new information to answer the question, where did Mill Creek go?

Ceramics and food: storage, consumption, and ceremonialism

- 1) Higher percentages of certain pottery styles at particular villages such as Kimball and Broken Kettle may suggest the nature of the Initial variant residence pattern. Can calculating the volume of ceramic vessels and data on storage pits at the Big Sioux phase sites lead to estimates of storage capacity, food consumption, and ultimately to Big Sioux phase demographics?
- 2) Were certain Mill Creek ware vessels from Big Sioux phase sites such as bowls and seed jars used in ceremonial feasting activities similar to the feasting activities proposed for Mississippian sites?

Artifacts as reflections of ideological systems

- 1) Much has been written about the ideological underpinnings of motifs found on Mississippian ceramics and other "special" artifacts. What portions of the Mississippian ideological system are imported into Initial variant society along with the characteristic motifs found on ceramics and other special trade items?
- 2) Do the presumed symbolic items in Big Sioux phase sites represent the products of a messianic movement resulting from a new type of contact with Mississippian culture(s)?

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Length of occupation and duration of early Middle Missouri tradition communities

- 1) The occupation and duration of early Middle Missouri tradition communities have been the subjects of considerable discussion especially with the review of the radiocarbon data and its limitations. The shortening of the Initial variant chronology has implications for the length of occupation of villages. What factors affected the duration of village occupation which is now believed to have ranged from as little as one year to as many as seventy years?
- 2) Assuming that villages were relocated, what factors affected the frequency of relocation and the position of villages on the landscape?

Intensification of agriculture

- 1) Intensive, corn-based (maize) agriculture is considered a hallmark of the Plains Village pattern. To date, while Big Sioux phase sites are believed to reflect this pattern, detailed paleobotanical analysis of site materials is relatively minimal. Would comprehensive analysis of extant and new collections provide information to support intensive agriculture as one factor in the longer duration of occupation argued for the Big Sioux phase sites (Lensink 2003a)?
- 2) Big Sioux phase sites contain paleobotanical remains of corn, subfloor storage pits, and cultivation implements—all associated with intensive agriculture. Similar evidence may be found in Great Oasis communities. Are there measurable differences in the type and quantity of domesticated species between Mill Creek and Great Oasis that suggest Mill Creek people were practicing a different agricultural pattern that might account for changes in community structure such as nucleation and defense, and expansion and interaction with outside communities?

Prehistoric Landscape

- 1) Big Sioux phase midden-mound villages, such as Kimball, exhibit evidence of numerous houses likely enclosed in defensive palisades and positioned on riverine and creek terraces near major confluences. They appear to be associated with community cemeteries situated in the nearby uplands. Combined with other site types, including agricultural field systems and fish weirs as known from Little Sioux phase sites, Mill Creek communities reflect the creation of a new, domesticated landscape hitherto unseen in the deep history of the Prairie-Plains (Roper 2007). Could application of technologies, such as geophysical survey or high precision mapping (LiDAR and Total Station), confirm other associated site types in the Big Sioux locality, and when combined with source analysis of site resources, provide evidence to map out the prehistoric landscape?

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F. Associated Property Types

Villages and mortuary facilities have been defined as property types for the historic context *Big Sioux Phase, A.D. 1100–1250*, of the MPDF *Archaeological Resources of the Initial Variant of the Middle Missouri Tradition in Iowa*. One site may reflect aspects of both property types, where a village also served as a mortuary facility. The property type descriptions, associated registration requirements and significance are presented herein. All resources associated with the identified context are archaeological in nature, and are counted as sites.

Several other *Big Sioux Phase, A.D. 1100–1250*, property types may exist, but have not yet been identified. These other property types are not developed in this MPDF, but may include lithic workshops, quarries, agricultural (ridged) field remnants, fish traps or weirs, butchering sites, other temporary camps, ceremonial sites, rock art, caches, pottery kilns (pits), and debris scatters with Big Sioux phase materials.

Fourteen Big Sioux phase sites have been identified (Table 3). Nine of these have been subjected to some professional or avocational archaeological excavation (13PM1, 13PM4, 13PM7, 13PM23, 13PM61, 13PM65, 13PM127, 13PM248, 13WD402). Construction-related disturbances or subsurface looting has occurred at six sites (13PM1, 13PM23, 13PM36, 13PM37, 13PM172, 13PM248, 13WD402). Two sites have had no known excavations or other subsurface disturbances, except for normal surface cultivation practices (13PM60, 13PM429/WD105). Unless prior destruction is well-documented, many partially excavated or disturbed properties may still contain valuable information, such as discrete artifact clusters, identifiable activity areas, archaeological features, or feature remnants.

Table 3. Big Sioux Phase Property Type Counts (as of April 1, 2010).

Property type	Site count	Totals	Site trinomial	Site name
Village	6			
with identified human remains	3		13PM1, 13PM4, 13PM61	Broken Kettle, Kimball, Larson
lacking identified human remains	3	3	13PM7, 13PM60, 13PM429/WD105	Joy Creek Major, Gytens, unnamed
Mortuary facilities	11	11		
within a village site	3		13PM1, 13PM4, 13PM61	
not within a specific village site	8		13PM23, 13PM36, 13PM37, 13PM65, 13PM127, 13PM172, 13PM248, 13WD402	Kimball burial, Belle Vista North, Belle Vista South, Rock Creek Ossuary, Ossuary #2, unnamed, Spirit Knoll, Siouxland Sand and Gravel
Total identified Big Sioux phase sites		14		

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Initial variant ceramics, including Chamberlain, Foreman, Mill Creek, and Sanford wares, have been found at several sites in the MPDF's geographic area, and even within close proximity to other Big Sioux phase sites, but are not included in Table 1. Such sites include 13PM11 (Postlewait Site) and 13PM8 (Joy Creek Minor; Dale Henning, personal communication 2009; Iowa Site File). At such sites, the ceramic assemblage is overwhelmingly Great Oasis, with only a few Mill Creek ceramic sherds. For now, these sites are not considered Big Sioux phase, but rather, Great Oasis. At other sites, such as Larson (13PM61), the surface expression of ceramics suggested twice as many Great Oasis rims (33 percent Mill Creek rims vs. 67 percent Great Oasis), but excavations dramatically reversed this distribution, revealing an overwhelmingly Mill Creek assemblage (Henning 1980a, 1982c, 1996). Henning (1996:15) declared Larson to be a single component site "which principally reflects the Mill Creek tradition and minimally reflects the Great Oasis tradition." For the present MPDF, 13PM60 and the nearby site 13PM61, which Henning believed similar to 13PM60 based on surface materials, are considered predominantly Big Sioux phase; future researchers may consider the merits of establishing a separate context for sites such as these.

There are presently no Big Sioux phase archaeological sites on the National Register. Four villages of the Little Sioux phase of the Initial variant of the Middle Missouri tradition in Iowa are on the National Register: 13BV1 (Chan-ya-ta Site, listed 1978), 13CK15 (Brewster Site, listed 1979), 13CK21 (Phipps Site, listed 1966), and 13OB4 (Wittrock Site, listed 1966). The Phipps and Wittrock sites have been designated National Historic Landmarks (Weiss 1974a, 1974b). Both sites are well-preserved villages of the Little Sioux phase of the Initial variant. The Wittrock Site, in O'Brien County, is considered unique due to its relative lack of disturbance since occupation. At least 20 dwellings stood on the site, fortified by a palisade and a ditch. In Cherokee County, the Phipps Site village formed a dense midden, similar to the midden found at the Big Sioux phase Broken Kettle (13PM1) and Kimball (13PM4) villages and the Little Sioux phase Brewster Site (13CK15). The Phipps Site has strongly influenced modern understanding of midden formation processes. Both sites have significantly contributed to our understanding of the transition to nucleated village life, the origins of the Middle Missouri tradition, changing subsistence patterns, and trade networks.

Outside of Iowa, the Middle Missouri Subarea National Historic Landmark Theme Study entitled *Village Sites of the Middle Missouri Subarea A.D. 1000-A.D. 1887 with a Focus on the Antecedents, Development, Spread, Influences, Achievements, Climax and Decline of the Mandan, Hidatsa and Arikara Cultures in North and South Dakota* (Winham et al. 1994) includes both Middle Missouri and Coalescent tradition sites. The geographic area of that theme study is limited to North and South Dakota. At least 253 village sites were the focus of this theme study, with 83 of those listed on the National Register and 16 more in the process of being nominated (as of 1994). Of these 83, eight villages are National Historic Landmarks. Three of the eight are Initial or Extended variant sites. There are two more National Historic Landmark Initial variant sites along other waterways in South Dakota.

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The National Historic Landmark Initial or Extended variant village sites, all in South Dakota, are:

- Bloom (39HS1, Lower James phase, IMMT-east)
- Crow Creek (39BF11, Swanson phase, IMMT-west)
- Langdeau (39LM209, Grand Detour phase, IMMT-west)
- Mitchell (39DV2, Lower James phase, IMMT-east)
- Vanderbilt (39CA1, EMMT)

In addition, numerous Initial variant sites in South Dakota are on the National Register, including:

- Antelope Creek (39ST55, IMMT-west)
- Brandon (39MH1, Brandon phase, IMMT-east)
- Breeden (39ST16, Anderson phase, IMMT-west)
- Cattle Oiler (39ST224, Cattle Oiler phase, IMMT-west and EMMT)
- Dinehart (39LM33, Swanson phase, IMMT-west)
- Jiggs-Thompson (39LM208, Grand Detour phase, IMMT-west)
- King (39LM55, Swanson phase, IMMT-west)
- Sheldon Reese (a.k.a., Goehring, 39HS23, Lower James phase, IMMT-east)

Property Type #1: Village

a. Description

Big Sioux phase village sites account for 42.9 percent of the identified Big Sioux phase sites (6 of the 14 sites; see Table 3, page 30). These are Broken Kettle (13PM1), Kimball (13PM4), Joy Creek Major (13PM7), Gytens (13PM60), Larson (13PM61), and an unnamed village (13PM429/WD105). Villages may also contain mortuary facilities (Property Type #2). All Big Sioux phase villages identified thus far are situated on terraces above the Big Sioux River (13PM4, 13PM7) or primary tributaries to that river (13PM1, on Broken Kettle Creek; 13PM61, West Branch Perry Creek; 13PM60 and 13PM429/WD105, Perry Creek). Details of village layout and lodge construction are provided in the Historic Context section; a summary is presented here.

Sites 13PM7, 13PM60, and 13PM429/WD105 have been subjected to surface collection only. The other three identified Big Sioux phase villages have received some professional archaeological excavation.

The most spectacular visual feature of at least two of the Big Sioux phase villages is their tell-like quality, with the village sitting atop a man-made mound on a river or creek terrace. A combination of factors may explain these accumulated deposits: later houses were built atop the detritus of earlier ones, soils were banked along exterior house walls, soils blanketing earlier houses were washed down and/or were scraped down when houses were rebuilt, and/or soils were imported to raise the village elevation (R. Alex 1973; Anderson 1985b, 1986; Baerreis and Alex 1974; Fishel 1995a; Lehmer et al. 1973; Tiffany 1982a; Van

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Nest 1995). Although this last aspect of midden formation has been studied within the Little Sioux phase sites, no detailed geomorphological investigation has occurred at a Big Sioux phase site, so whether there was a deliberate addition of soil at these sites is not yet known.

A raised "mound midden" was definitely present at 13PM1 and 13PM4 and absent at 13PM61 (Henning 1982b:22), with the presence or absence not confirmed at the other three villages. At the time of Orr's 1939 excavations at 13PM4, the "mound midden" had been built up by Initial variant people a minimum of 2.3–2.4 m (7.5–8.0 feet) above the natural ground surface, keeping in mind that the area had probably been cultivated for at least 60 years prior to Orr's study. More than two decades after Orr's excavations, Bryson and Baerreis (1968:13) reported a 2.4–2.6-m (8.0–8.5-ft)-thick midden deposit remained near the top of the 13PM4 midden, and 1.9 m (6.3 ft) at a location closer to the edge of the midden. Recently, Whittaker (2010) discovered the midden still contains 2.0–2.6 m (6.5–8.5 feet) of materials. Orr's investigations at 13PM1 revealed that the village mound was 2.6 m (8.5 ft) above the natural surface near its center (Orr 1942).

Big Sioux phase village acreages range from 0.34 to 3.65 hectares (0.84 to 9.01 acres). At least five Little Sioux phase villages were fortified by a palisade and/or ditch. No such fortifications have been confirmed within the Big Sioux phase, although geophysical investigations suggest Kimball Village may have been surrounded by a ditch and palisade (Kvamme 2009). Along the Little Sioux, there is evidence some houses were semi-subterranean, wattle-and-daub covered houses with a timber superstructure and extended entryways. Despite his extensive work at Big Sioux phase Site 13PM4, Orr's (1942) work only confirmed the timber superstructure, with evidence of the other common superstructure elements at the Little Sioux phase absent at 13PM4. The absence of an excavated house floor, wattle-and-daub, or extended doorways may be more a function of the 1939-excavation methodology, than of actual differences in house construction methods. All identified Big Sioux phase lodges are rectangular. Some houses at Little Sioux phase sites were diamond or square-shaped (e.g., Chan-ya-ta, Wittrock, 13BV1, 13OB4), so it is possible that non-rectangular houses were present at Big Sioux phase villages as well.

At 13PM61, no houses were confirmed during the excavations, although several pit features were present (Henning 1982c:29), and Henning suspected a house was present (1996:16). Orr's (1942:28–29) work at 13PM1 revealed a square-to-rectangular shaped post-mold alignment, which he was hesitant to definitively call a house, even though it did contain a central fireplace. The 1969 excavations of three 1.5-x-1.5-m test units at 13PM1 exposed three house basins, stacked one atop another, in a side wall profile (Henning and Henning 1982:15). No dimension estimates were possible, given that only a very small part of the houses were exposed in the test units.

Only the excavations at 13PM4 exposed houses to an extent that their dimensions are measurable (Table 4), although the size of one lodge at 13PM1 can be roughly extrapolated (Table 4). At 13PM4, at least three lodges were identified by Orr (1942). He presumed the lodges were contemporaneous, based on the presence of post molds extending into the subsoil to similar depths and because the post molds from

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Table 4. Big Sioux Phase House Information (compiled from Orr 1942).

Site	House	ft	m	ft ²	m ²	Associated features
13PM1	A	20 x 30	6.1 x 9.1	600	55.5	central firepit; ash deposit
13PM4	A	20 x 25	6.1 x 7.6	500	46.4	none identified
	B	20 x 28	6.1 x 8.5	560	51.9	central firepit
	C	18 x 29	5.5 x 8.8	522	48.4	central firepit; one or two interior support posts; four interior storage pit; one interior burial pit; one exterior storage pit, bark-lined

the separate houses were encountered at the same upper elevational levels. Houses were spaced 3.6-m (12-feet) apart, with the north sides aligned in a row. Less than 30 percent of the house interior at 13PM1 was excavated. At 13PM4, Houses A, B, and C were investigated with, respectively, 30, 33, and 82 percent of the interiors excavated.

The number of lodges once present at Big Sioux phase villages has not been well understood, simply because there have been few opportunities to study them as a single, village unit. The greatest square footage of excavation has occurred at Broken Kettle (13PM1), but many of these digs were by avocational archaeologists, and are poorly documented. The recent geophysical investigation at Site 13PM4 is the first modern breakthrough in understanding the layout of an entire Big Sioux phase village. Kvamme (2009) used non-invasive scientific methods to examine subsurface soil anomalies without actually digging. Magnetometry revealed at least 20 house features within the site (including the three found by Orr), spaced in even rows. Small anomalies around the site perimeter may be former palisade posts. The village layout evidence from 13PM4 compares favorably with that found at the Little Sioux phase Wittrock Site (13OB4), a National Historic Landmark. Both sites show obvious formal planning of the village layout, with houses constructed in rows. Apart from archaeological work of modest disturbance, Wittrock has not been impacted by construction or cultivation. In fact, the reason the village layout is so well understood is that the ditch surrounding the village, as well as the individual houses, can be seen even today as surface depressions.

Some mortuary facilities, either isolated burials or ossuaries, were located in the Loess Hills above and within view of the village. This appears to be the case with 13PM4 and burial sites 13PM23 and 13PM248, and at 13PM1 and burial sites 13PM36, 13PM127 and 13PM172. In the case of the burials within sight of 13PM1, these burials were probably situated on upland toeslopes. The burials in the uplands above 13PM4 were definitely at apex or shoulder positions in the uplands. Other burials were located within houses, as has been verified at 13PM4, or within the village boundaries, but not necessary within a house, such as at 13PM1. An earsspool found at 13PM61 may have been fashioned from human remains.

Villages may include the following features: house depressions, post-mold alignments, compacted floors, burned timbers and clay wattle, burned or unburned roofing material, hearths, storage (cachement) pits, refuse pits, burial pits, refuse middens, surrounding ditches, and/or clusters of artifacts. A former owner of 13PM1 reported a possible prehistoric pottery kiln eroding out of the site in the late 1870s. This feature was described as a "...clay pottery oven, probably two and one-half feet square and two feet deep, with

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walls two or three inches thick of clay" (Orr 1942:3). Storage pits, up to 2-m (6.6-ft) deep, may be found on the interior or exterior of the houses. Pits may be lined or unlined, straight-sided, basin-shaped or bell-shaped. At 13PM1, Orr (1942) believed large pieces of well-preserved elm bark may have been collapsed roofing from a structure.

b. Significance

Villages of the *Big Sioux phase, A.D. 1100-1250* context are significant storehouses of information about all aspects of the lives of Initial variant peoples (Criterion D). Big Sioux phase villages signify the actual origin and initial development of the Middle Missouri tradition. They reflect the response of indigenous, resident Late Woodland societies to significant economic and social processes occurring throughout the Prairie-Plains region a millennium ago. Once established, the Middle Missouri tradition presented a new phenomenon on the Prairie-Plains—a lifeway based on self-sustaining, sedentary villages and a tribal society that successfully persisted for over eight centuries. Through study of these villages, the domestication of a landscape itself is witnessed. Big Sioux phase villages provide the very first glimpse of an adaptive system later documented by traders and artists on the Upper Missouri River system beginning in the 17th century. The well-preserved stratigraphic horizons, lodge remnants, storage pits, activity areas, and breathtakingly rich and diverse artifact assemblages at these villages provide research opportunities into various topics related to Initial variant peoples, including contact and trade, the interaction of climate and culture, nucleation of communities, tribal identities, ceramics and food, development of new technologies, intensification of agriculture, prehistoric landscape, and origins of the Plains Village pattern.

Village sites of the Big Sioux phase Initial variant of the Middle Missouri tradition may be designated at three progressive levels of significance: local, state, and national. If a nominated resource is significant at a national level, by default it is also significant at the local and state levels. Likewise, a site significant at the state, but not national, level is also locally significant.

Local Significance

Some sites are significant at the local level. These sites contain information that contribute to understanding local patterns or local interests, but lack evidence that relates to broader statewide or national issues. Scientific or depositional integrity may be severely compromised, but sufficient data remain to answer locally pertinent questions, such as cultural affiliation or site age. These villages may be considered eligible for the NRHP on a local level. Such severely compromised sites can be considered a contributing element in conjunction with a multiple property listing of other Initial variant sites holding state or national levels of significance.

State Significance

Villages significant at the state level contain features or artifacts that relate to broader statewide or regional cultural patterns, but that lack data that relate to national issues. These sites may address some of the

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research questions set forth in this MPDF, but lack sufficient integrity to address the majority of them. For example, villages that once contained intact houses, but which have moderately compromised depositional integrity may still be considered significant on this level if the potential to address a variety of statewide or regionally important research questions is present. Villages of statewide significance may be considered a contributing element in conjunction with a multiple property listing of other Initial variant sites holding a national level of significance.

National Significance

Villages that have the potential to address all or most of the research questions set forth in this MPDF can be considered for nomination at a national significance level. To address all or most of these questions, the site may be slightly disturbed, for example, by cultivation or previous archaeological excavations, but must maintain sufficient depositional and historical integrity for the village layout, house forms, activity areas, and if once present, the palisade or surrounding ditch, to be discernible. If this integrity is present, then the potential for recovering the scientific data needed to better understand the prehistory of the United States will be obtainable. Initial variant village sites with recognizable, well preserved features may be significant at a national level of significance as they often aid in understanding broad patterns of prehistory that are otherwise difficult to discern. The absence of depositional integrity will preclude nomination at a national level of significance, although the site may be considered eligible for the NRHP at the state or local level.

Nomination: Kimball Village

Kimball Village (a.k.a., archaeological site 13PM4, Kimball Village, Kimball Site, Kimball Mound; Peterson, Alex, and Whittaker 2010) is being nominated as a property associated with the historic context *Big Sioux Phase, A.D. 1100–1250*, as a combination village and mortuary facility site. This MPDF was written with the intention that the present study will nominate Kimball Village and future studies will nominate other properties associated with the historic context. This MPDF should be expanded and amended as needed to better reflect additional contexts. Likewise, additional property types may be added by future studies.

c. Registration Requirements

To be considered for nomination to the National Register of Historic Places under the historic context, *Big Sioux phase, A.D. 1100–1250*, a village must demonstrate it possesses all of the following criteria:

1. Location within the defined geographic area.
2. Big Sioux phase age.
3. Research potential.
4. Integrity.

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1. Location within the defined geographic area

The village site is within the MPDF's defined geographic boundaries of Buena Vista, Cherokee, O'Brien, Plymouth, and Woodbury counties. Spatial boundaries of the geographic area may be adjusted by future discoveries.

2. Big Sioux phase age

Archaeological investigations should demonstrate that the village site dates to the Big Sioux phase, A.D. 1100–1250. This connection may be demonstrated through a variety of means, including, but not limited to, radiocarbon dating, ceramic cross-dating, and the presence of pottery or other artifacts diagnostic to Initial variant peoples. Initial and terminal dates could be adjusted by future discoveries.

3. Research potential

Archaeological investigations should show that the village site has the potential to contribute to better understanding of the local Late Prehistoric history and regional issues of Initial variant cultures and trends in the Middle Missouri tradition. Further research may identify areas of significance that would support the eligibility of the site under Criterion A or C. Research potential can be identified from the sub-topics discussed in Section E. These sub-topics include the categories of:

1. Origins of the Plains Village pattern;
2. Interaction between climate and culture;
3. Nucleation and fortification of communities;
4. Establishment of tribal identities;
5. Expansion and intensification of Mississippian contact and influence on the Prairie Peninsula;
6. Ceramics and food: storage, consumption, and ceremonialism;
7. Artifacts as reflections of ideological systems;
8. Length of occupation and duration of early MMT communities;
9. Intensification of agriculture; and/or
10. Prehistoric landscape.

4. Integrity

The requirements for integrity were derived from the documented condition of similar properties. Literature review aided in determining what conditions of preservation are required for site data to significantly contribute to our understanding of the Middle Missouri tradition, particularly, the Big Sioux phase.

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In the guidelines and criteria set forth by the Department of the Interior for the National Register of Historic Places (National Park Service 1998, 1999, 2000), integrity is a key component to any site evaluation, be it archaeological or architectural in nature. Integrity is defined as "the ability of a property to convey its significance" and "to retain historic integrity a property will always possess several and usually most of the aspects" of integrity (National Park Service 1998:44). The seven aspects of integrity are location, design, setting, materials, workmanship, feeling, and association.

The National Park Service (2000:35-36) specifies that, "Location, design, materials, and association are generally the most relevant aspects of integrity under Criterion D...Under Criteria C and D, integrity of setting adds to the overall integrity of an individual site and is especially important when assessing the integrity of a district. Integrity of feeling also adds to the integrity of archeological sites or districts as well as to other types of properties. Integrity of setting and feeling usually increases the 'recognizability' of the site or district and enhances one's ability to interpret an archeological site's or district's historical significance."

Therefore, for village sites of the Big Sioux phase, integrity of location, materials, and association are of primary importance when nominating sites under Criterion D. Integrity of design, setting, workmanship, and feeling can also add to the site's integrity, although they are not critical aspects in this context. A plowed site can retain sufficient integrity if it has discernible activity areas or patterning associated with the period of significance and if it possesses good integrity of setting, materials, and association.

Property Type #2: Mortuary facility

a. Description

Mortuary facilities at Big Sioux phase sites in Iowa may consist of human remains that have been recovered as flexed, extended, or bundle burials from ossuaries or isolated burial pits; from burial pits within a village; or as artifacts that have been fashioned from human remains at a village site. There is some evidence for scattered human remains (i.e., not associated with known features) within a village (13PM4 and possibly, 13PM1), although this may be more a function of 1930s-excavation techniques than actual mortuary practice. Further details regarding mortuary practices are found in the historic context.

Human remains have been identified at 78.6 percent of the identified Big Sioux phase sites (11 of the 14 sites; Table 5; also see Table 2). Human remains have been recovered from three villages (Property Type #1) and from eight sites that are primarily or exclusively burial locations (i.e., not located within a village).

Although all of the mortuary facility sites have seen some disturbances, none of these sites can be documented as completely destroyed. In the case of the villages, significant portions of these sites definitely remain intact. Professional investigations suggest that 13PM23, 13PM248, and 13WD402 definitely still contain undisturbed burials. Less is known about the level of preservation at the other sites.

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Table 5. Big Sioux Phase Mortuary Facility Sites.

Site	Site name	Isolated burials, cemetery, or within village
13PM1	Broken Kettle	Within village
13PM4	Kimball	Within village
13PM23	Kimball Burial Site	Cemetery
13PM36	Belle Vista North	Isolated
13PM37	Belle Vista South	Isolated
13PM61	Larson	Within village
13PM65	Rock Creek Ossuary	Cemetery
13PM127	Ossuary #2	Cemetery
13PM172	(unnamed)	Cemetery
13PM248	Spirit Knoll	Cemetery
13WD402	Siouxland Sand and Gravel	Cemetery

The number of interments from a single site is not known because no Big Sioux phase mortuary facility site has been fully excavated by a professional archaeologist. For example, information about sites 13PM36 and 13PM37 is limited to a 1965 Iowa Site File (ISF) form filed by an avocational archaeologist that states these are isolated burials. On one of these forms there is no mention of grave goods, although the knowledgeable site recorder (Roger Banks) stated that it was a "Mill Creek" burial. At the other extreme is site 13WD402, where more than 150 burials, many of them limestone-slab-covered, have been verified by professional archaeologists (Anderson 1978; Anderson et al. 1979; Fisher 1978, 1980; Lillie 2004b; Lillie and Schermer 1990). There, grave goods were breathtaking both in quantity and workmanship, best exemplified by a long-nosed god mask made of whelk shell (*Busycon* sp.).

Ellison Orr's excavations (1942) uncovered human remains at 13PM1, 13PM4, and 13PM127. There is much to be gained by reexamination of Orr's notes, reports, drawings, and photographs of burials, and the subsequent modern analysis of the materials. But in many instances, Orr's WPA excavators encountered isolated human remains which were not recognized as such until they were brought into the laboratory. Such was especially the case at 13PM4, where the isolated fragments from four individuals were not recognized as human in the field, but were later identified in the laboratory (Orr 1942; Schermer et al. 1998:69). Later work at 13PM4 identified a burial pit intruding into an older, bell-shaped storage pit (Baerreis 1968:142-143; Henning et al. 1968:83; Peterson 1969).

At Site 13PM127, Orr (1942:51) salvaged the remains of a bundle burial that had been disturbed by cultivation. Modern analysis identified fragmentary elements of at least six individuals: four adults and two children (Schermer et al. 1998). Given the excavation methods in 1939, it is impossible to say if only portions of these individuals were buried at 13PM127, or if Orr returned only selected human remains to the laboratory. Orr's (1942:57) work at Broken Kettle Village (13PM1) reported on several burials, possibly in three separate locations within the site. Modern examination of the materials revealed at least 10 individuals were present (Schermer et al. 1998).

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The level of professional excavation at other mortuary facilities is variable. Professional-only-excavation has occurred at Larson Village (13PM61; Henning 1982c:27, 179–180a, 192–193). An earspool from the site has not been verified as human bone, but the cataloguer stated it was fashioned from a “probable human skull.” In this case, the information recovered about burial practices was slight, but information gained about human remains as a cultural object was considerable. The earspool was excavated from Level 6 at Unit 50NE10. Several pit features were present in this 2-x-2-m unit and at this depth, but the artifact catalog does not mention that the artifact was found within a feature. Reworked human remains are not unheard of at Initial variant sites, with these reported from the Little Sioux phase Phipps Site (13CK21; Fugle 1962:37) and the Lower James phase Mitchell Site in South Dakota (39DV2; Meleen 1938:12).

The other Big Sioux phase mortuary facility sites have been salvaged after construction, quarrying, looting, or animal burrowing disturbances at sites 13PM23, 13PM65, 13PM172, 13PM248, and 13WD402. The remaining sites, 13PM36 and 13PM37, were probably looted and subsequently reported to the Iowa Site File by avocational archaeologists who saw the collections or disturbed burial sites. Looting and erosion revealed human remains in three locations at the Kimball Burial Site (13PM23) and the remains were subsequently salvaged by Patricia Williams (1983; Fisher 1983), a highly trained avocational archaeologist. One burial was fully extended. The two other locations appeared to be bundle burials. Most were buried between 15-to-60-cm (6-to-24-in)-deep. Probing of the ridge top conducted by Williams suggests additional burials are located across the length of the landform.

Professional archaeologists and volunteer assistants rescued remains from the vandalized Rock Creek Ossuary (13PM65). Looters had dug into the site with a shovel in several places. The backdirt from the looters was screened, and a roughly 8 m² (88 ft²) area surrounding the largest disturbance was excavated. Human remains were found to a maximum depth of 60 cm (24 in) below surface. The remains of at least 29 individuals were recovered, including 19 persons aged 12 and under, and 10 persons over the age of 17 (Anderson and Baerreis 1973; Fisher 1977b:3–9).

At 13PM172, a landowner alerted avocational archaeologists to the presence of human remains in soil thrown up from a badger hole (Lilly and Banks 1965a, 1965b). They excavated about 9.3 m² (100 ft²) centered atop the remains, proceeding in 7.6-cm (3-in) levels. Maximum depth of the materials was 91 cm (36 in). Cultivation had disturbed the upper 20 cm (8 in). Rodent disturbance was extensive. The men reported 14 burial “locations,” often with multiple individuals within each. A complete Mill Creek vessel with a Mitchell Modified lip was found in association with Burial 14, touching the interred woman’s skull (Lillie 1996).

Earthmoving in 2005 on a high knoll east of 13PM4 uncovered human remains at a previously unrecorded site, 13PM248 (Office of the State Archaeologist of Iowa 2005). Initially it was believed the site had been destroyed, but archaeological investigations determined much of the site remained intact. A minimum of 58 individuals were disturbed by the earthmoving, but many more burials are believed to be present at the site. The site has been stabilized, re-vegetated, and protected. Diagnostic artifacts, recovered in disturbed contexts, suggest the burial site was used by Late Woodland, Great Oasis, and Mill Creek peoples.

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The Siouxland Sand and Gravel Site (13WD402) was first identified in 1972, when a large prehistoric cemetery was impacted by quarrying operations (Anderson et al. 1979; Fisher 1978, 1980; Hawkins 2008; Lillie 2004b; Lillie and Schermer 1990). There are two portions of the site, deemed "upper" and "lower" due to their relative topographic positions. Most, if not all, of the lower portion of the site has been destroyed. In 1979, an estimated 30–40 percent of the upper part of the site was intact (Anderson et al. 1979:140). The landowner agreed to protect this area, but additional soil removal occurred in the early 1980s. Involvement of the Iowa Attorney General's Office halted all quarrying activity. The remainder of the site was recently acquired by the Iowa Department of Natural Resources (DNR). Because archaeologists have mostly performed salvage archaeology at 13WD402, very little is known about individual burial practices there. However, many burials in both the upper and lower portions of the cemetery were covered in limestone slabs that ranged from 10 to 45 cm (4 to 18 in) in diameter. Both primary and secondary burials were present, including some secondary burials that seemed to evidence cremation.

The previous discussion shows that methods of interment were variable. At mortuary-only locations, bundle burials within a burial pit have been documented at 13PM127 and 13PM172 (Orr 1942:19, 51). Despite looting at 13PM23, Williams (1983) was able to determine that at least one burial was once extended and oriented north-south, with her head at the north and, possibly, clamshell in association with the burial. A variety of burial practices were noted at 13PM65, including tightly flexed individuals; individuals in supine positions; secondary, scattered remains; and one mass ossuary that showed cremation evidence (Anderson and Baerreis 1973).

Within villages, 13PM1 contained an adult buried in an extended position, and a partly bundled child buried about 1 m (3 ft) from the flexed, but incomplete, remains of an adult. One ossuary pit at 13PM4 contained the bundled, partial remains of at least four persons: an older infant, a teenaged female, a male in his twenties, and a possible young adult male. It is possible these remains represent interment after a scaffold burial. Also at this site, Orr mentions the bundled remains of two children within a burial pit in a house, but modern analysis suggests the remains of only one individual, aged 5.5–6.5, was present or returned to the laboratory (Orr 1942; Schermer et al. 1998). The flexed remains of an adult male were found in a burial pit at this site as well (Baerreis 1968:142–143; Henning et al. 1968:83; Peterson 1969). Isolated or fragmentary remains were recovered from village deposits at both sites.

Some information about disease and cause of death has been revealed from these sites. Dental caries, periodontal disease, and osteoarthritis were noted in several of the Mill Creek individuals found at the above described sites. One late-middle-aged female's burial at 13PM23 suggested arthritis caused by an injury that had immobilized her "upper leg in a flexed position" (Fisher 1983:280). Two elements at 13PM65 had projectile point wounds. One vertebra had a small, triangular, side-notched "black chert" projectile point partially embedded; another, very similar point was embedded within a clavicle (Anderson and Baerreis 1973:5; Fisher 1977b:7–8). It was not possible to determine whether these elements were from the same individual.

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The quantity and types of grave goods has been variable. Given that several burial sites have been looted, presumably items such as stone tools and more complete ceramic vessels, along with worked bone or shell, have been removed before salvage by archaeologists. At 13PM65, grave goods associated with the minimum of 29 individuals there included a catlinite zoomorphic effigy pendant, a catlinite disk fragment, cordmarked body sherds, a perforated deer phalanx (toe bone), a projectile point midsection, a flake, a lump of "orange daub," a worked piece of shell, possibly from a pendant; and several beads (Anderson and Baerreis 1973:5). Beads numbered 13, and were fashioned from shell (*Anculosa praerosa* and *Campelema decisum*) and bird bone. A nearly identical zoomorphic pendant was found by a collector at the Kimball Village site (13PM4; Anderson 1973b). Grave goods from 13PM172 were also extensive. Items associated with burials included bone awls; other, unspecified bone tools; shell beads; unworked mussel shell; ceramic sherds; a complete Mill Creek vessel; triangular points; flaking debris; and a possible bone bracelet. Also from this site was a "thunderbird shell effigy" found there several years prior to the 1965 excavations (Lilly and Banks 1965a, 1965b). Several of the 14 noted burials lacked any grave goods. As a final example, some items recovered from 13WD402 include ceramics; beads of bird bone and shell (*Anculosa* sp., *Busycon* sp., and *Comus* sp.); pendants made of flat shell and columella; unworked mussel shell; end scrapers; a modified snout from a wolf's skull (*Canis lupus*), probably used as a mask; and the aforementioned long-nosed god mask made of shell. A similar shell mask was recovered from a Little Sioux phase village (13CK1; Jones Village; Anderson 1975a). Many of the shell items and ceramics are indicative of trade with Mississippian cultures.

b. Significance

Mortuary facilities of the *Big Sioux phase*, A.D. 1100-1250 context are significant storehouses of information about many aspects of the life and death of Initial variant peoples (Criterion D). Because Big Sioux phase mortuary facilities date to the actual origin and initial development of the Middle Missouri tradition, these sites reflect the response of indigenous, resident Late Woodland societies to significant economic and social processes occurring throughout the Prairie-Plains region a millennium ago. Lifeways were changing on a grand scale, transitioning to self-sustaining, sedentary villages and a tribal society that would successfully persist for over eight centuries. Mortuary practices at Big Sioux phase sites reflect the cusp of these changes, evidencing ritualized burial practices in their richly diverse grave goods, many of which include elaborately artistic, ceremonial, or imported goods. These mortuary facilities provide research opportunities into various topics related to Initial variant peoples, including contact and trade, the interaction of climate and culture, nucleation of communities, tribal identities, ceramics and food, development of new technologies, origins of the Middle Missouri tradition, and the nature of the prehistoric landscape.

Several kinds of properties are not commonly considered eligible for listing in the National Register: religious properties, moved properties, birthplaces and graves, cemeteries, reconstructed properties, commemorative properties, and properties that achieved significance within the last fifty years. These kinds of properties may be eligible if they meet special requirements, called Criteria Considerations. Criteria Considerations do not apply to the present MPDF, because "except for the graves of significant historic individuals, burial

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places nominated under Criterion D need not meet the special requirements of the Criteria Considerations” (Potter and Boland 1992:14).

Mortuary facility sites of the Big Sioux phase Initial variant of the Middle Missouri tradition may be designated at three progressive levels of significance: local, state, and national. If a nominated resource is significant at a national level, by default it is also significant at the local and state levels. Likewise, a site significant at the state, but not national, level is also locally significant.

Local Significance

Some sites are significant at the local level. These sites contain information that contributes to understanding of local patterns or local interests, but lack evidence that relates to broader statewide or national issues. Scientific or depositional integrity may be severely compromised, but sufficient data remain to answer locally pertinent questions, such as cultural affiliation or age. These mortuary facility sites may be considered eligible for the NRHP on a local level. Such severely compromised sites can be considered a contributing element in conjunction with a multiple property listing of other Initial variant sites holding state or national levels of significance.

State Significance

Mortuary facility sites significant at the state level contain features or artifacts that relate to broader statewide or regional cultural patterns, but that lack data that relate to national issues. These sites may address some of the research questions set forth in this MPDF, but lack sufficient integrity to address the majority of them. For example, mortuary facilities which have compromised depositional integrity may still be considered significant on this level if the potential to address a variety of statewide or regionally important research questions is present. The differences or similarities of burial features among Initial variant peoples may be important in understanding the variety of burial practices within the state. Sites that aid in understanding exchange patterns also may be significant at the state level, and the analysis of trade goods within mortuary facilities, may aid in understanding those patterns. Mortuary facility sites of statewide significance may be considered a contributing element in conjunction with a multiple property listing of other Initial variant sites holding a national level of significance.

National Significance

Mortuary facility sites that have the potential to address all or most of the research questions that directly relate to human remains and are set forth in this MPDF can be considered for nomination at a national significance level. The site may be slightly disturbed, for example, by cultivation or previous archaeological excavations, but must maintain sufficient depositional and historical integrity for the mortuary facility form to be discernible, be this an isolated grave, ossuary, human remains used as a cultural artifact, or other, yet undefined mortuary facility form. If this integrity is present, then the potential for recovering the scientific data needed to better understand the broad prehistory of the United States will be obtainable. The absence of depositional integrity will preclude nomination at a national level of significance, although the site may be considered eligible for the NRHP at the state or local level.

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c. Registration Requirements

To be considered for nomination to the National Register of Historic Places under the historic context, *Big Sioux phase, A.D. 1100–1250*, a mortuary facility must demonstrate it possesses all of the following criteria:

1. Location within the defined geographic area.
2. Big Sioux phase age.
3. Research potential.
4. Integrity.

1. Location within the defined geographic area

The mortuary facility is within the MPDF's defined geographic boundaries of Buena Vista, Cherokee, O'Brien, Plymouth, and Woodbury counties. Spatial boundaries of the geographic area may be adjusted by future discoveries.

2. Big Sioux phase age

Archaeological investigations should demonstrate that the mortuary facility dates to the Big Sioux phase, A.D. 1100–1250. This connection may be demonstrated through a variety of means, including, but not limited to, radiocarbon dating, ceramic cross-dating, and the presence of pottery or other artifacts diagnostic to Initial variant peoples. Initial and terminal dates could be adjusted by future discoveries.

3. Research potential

Archaeological investigations should show that the mortuary facility site has the potential to contribute to better understanding of the local Late Prehistoric history and regional issues of Initial variant cultures and trends in the Middle Missouri tradition. Research potential can be identified from the subtopics discussed in Section E. These subtopics include the categories of:

1. Origins of the Plains Village pattern;
2. Interaction between climate and culture;
3. Nucleation and fortification of communities;
4. Establishment of tribal identities;
5. Expansion and intensification of Mississippian contact and influence on the Prairie Peninsula;
6. Ceramics and food: storage, consumption, and ceremonialism;
7. Artifacts as reflections of ideological systems;

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8. Length of occupation and duration of early MMV communities;
9. Intensification of agriculture; and/or
10. Prehistoric landscape.

4. Integrity

The requirements for integrity were derived from the documented condition of similar properties. Literature review aided in determining what conditions of preservation are required for site data to significantly contribute to our understanding of the Middle Missouri tradition, particularly, the Big Sioux phase.

In the guidelines and criteria set forth by the Department of the Interior for the National Register of Historic Places (National Park Service 1998, 1999, 2000), integrity is a key component to any site evaluation, be it archaeological or architectural in nature. Integrity is defined as "the ability of a property to convey its significance" and "to retain historic integrity a property will always possess several and usually most of the aspects" of integrity (National Park Service 1998:44). The seven aspects of integrity are location, design, setting, materials, workmanship, feeling, and association.

The National Park Service (2000:35-36) specifies that, "Location, design, materials, and association are generally the most relevant aspects of integrity under Criterion D... Under Criteria C and D, integrity of setting adds to the overall integrity of an individual site and is especially important when assessing the integrity of a district. Integrity of feeling also adds to the integrity of archeological sites or districts as well as to other types of properties. Integrity of setting and feeling usually increases the 'recognizability' of the site or district and enhances one's ability to interpret an archeological site's or district's historical significance."

Therefore, for mortuary facilities of the Big Sioux phase, integrity of location, materials, and association are of primary importance when nominating sites under Criterion D. Integrity of design, setting, workmanship, and feeling can also add to the site's integrity, although they are not critical aspects in this context. A plowed site can retain sufficient integrity if it has discernible activity areas or patterning associated with the period of significance and if it possesses good integrity of setting, materials, and association.

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G. Geographical Data

The geographic area for the MPDF *Archaeological Resources of the Initial Variant of the Middle Missouri Tradition in Iowa* is limited to five counties, all in northwest Iowa: Buena Vista, Cherokee, O'Brien, Plymouth, and Woodbury (Figure 11). These counties contain known Initial variant of the Middle Missouri tradition sites. Spatial boundaries of the geographic area may be adjusted by future discoveries.

Mill Creek ceramics have been found in several other locations, notably Allamakee, Dickinson, and Emmet counties, and even in southwestern Wisconsin. Such sites well outside the defined geographic area are thought to contain Mill Creek items as trade goods and are presently excluded from this MPDF.

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H. Summary of Identification and Evaluation Methods

The Multiple Property Documentation Form *Archaeological Resources of the Initial Variant of the Middle Missouri Tradition in Iowa* is the culmination of archaeological work in the region that began in the 1870s with the first descriptions of earthlodge remnants and midden mound villages and most recently has entailed efforts to assess the integrity of previously and newly identified lodges, villages, and mortuary sites and preserve them (Alex and Lensink 2001; Gartner 2003; Goodmaster 2007a, 2007b; Lensink 2003a; Whittaker 2010). The *Big Sioux Phase, A.D. 1100–1250* context represents the westerly manifestation of the Initial variant in Iowa. Section H provides a discussion of how the historic context was developed and the property types and registration requirements were chosen.

Overview of Investigations

Big Sioux phase sites in Iowa are represented by villages and mortuary facilities. Earthlodge villages, in particular, have fascinated archaeologists since the contents of the deep midden mound villages were first studied in the 1870s. Over the past 130 years, professionals and laypersons alike have excavated these villages in an effort to understand the people who lived along the Big Sioux drainage nearly 1,000 years ago. Four overlapping stages of archaeological work have characterized Big Sioux phase studies in Iowa's Loess Hills. Examination of literature produced over these thirteen decades has provided the documentation to identify and evaluate Big Sioux phase site potential for listing on the NRHP under this historic context.

Stage 1, 1870s–1920s: Antiquarians, Amateurs, and Academies

Archaeological sites along the Big and Little Sioux rivers and their tributaries in northwest Iowa later assigned to the Mill Creek culture (Keyes 1927), were reported early in the Euroamerican settlement of the area, and investigated by resident farmers, relic hunters, and individuals associated with early scientific academies by the 1870s (Anderson 1975c; Banks and Lilly 1968). In Plymouth County north of Sioux City, a large, elevated midden-mound cut through by Broken Kettle Creek exposing abundant pieces of bone, shell, and especially pottery drew early interest. This site, referred to as Broken Kettle (13PM1), became the focus of most of the early archaeological exploration of the area. Chance discoveries and deliberate excavations at the site were described in the early county history (Western Publishing Company 1882), in correspondence between local archaeological enthusiasts and institutions including the Smithsonian Institution (Wakefield 1887) and the Sioux City Academy of Sciences and Letters (Banks and Lilly 1968), and in a few early publications (Powers 1910; Stafford 1906). The Kimball site (13PM4) another large, midden mound three miles south of Broken Kettle on the Big Sioux, went largely unnoticed except for successive owners or tenants of the property who allowed artifact collecting (Orr 1942). As was typical of this era and of a region where early settlers had encountered indigenous residents and typically found them wanting, discoveries at the Broken Kettle site were lauded as exemplary of an earlier, extinct "civilization" (e.g. Stafford 1906). Useful to modern researchers are early descriptions including estimated dimensions

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and an early sketch of the Broken Kettle mound (Banks and Lilly 1968; Powers 1910; Stafford 1906), and the report of human remains at the site as well as at locations nearby. These latter, ultimately, would be confirmed as separate mortuary sites (Orr 1942).

Stage 2, 1920s–1960s: First Scientific Investigations

Beginning with the interests of Charles R. Keyes in the 1920s, and his appointment in 1921 to head up the Iowa Archaeological Survey under the auspices of the State Historical Society of Iowa, the prehistoric sequence of Iowa was set to unfold. Keyes' activities on behalf of the rich village sites of northwest Iowa produced details of the Mill Creek culture he first defined (1927, 1941a, 1942) and established the basis for its classification according to emerging North American taxonomic systems (Anderson 1975c; Griffin 1935; Keyes 1935a). By 1935, Keyes had classified sites in the two geographical locations into a Big Sioux focus and Little Sioux focus within a Mill Creek Aspect (Keyes 1935a) according to McKern's (1939) newly created Midwestern Taxonomic System. By this time also, Keyes and other researchers were beginning to draw parallels between the Mill Creek villages and similar sites to the west in the Dakotas as well as to Middle Mississippian discoveries to the east (Griffin 1935, 1967). Keyes coordinated the first major excavations at two of the Big Sioux phase sites, Broken Kettle and Kimball, conducted by Ellison Orr in the 1930s. Orr's report presented a wealth of information on material culture and evidence of house plans uncovered at Kimball and documented related mortuary sites (Orr 1942). Collections from this research made important contributions to later studies (e.g., Flanders 1960; Fugle 1962; Ives 1962) and along with the abundant maps and notes provided by Keyes and Orr remain an important data base for modern researchers.

No additional major excavations were carried out at Mill Creek sites on the Big Sioux in Iowa until the 1960s. The Sanford Museum, the Northwest Chapter of the Iowa Archeological Society, and The University of Iowa, however, remained active at Little Sioux locality sites throughout the 1950s (Anderson 1975c; Ruppé 1955a, 1955b, 1957, 1959a, 1959b). The Big Sioux locality sites were factored into taxonomic classifications and cultural-historical reconstructions resulting from these investigations (e.g., Ives 1962; Ruppé 1959a).

Stage 3, 1960s–1980: The Climatic Model

During this period research shifted from descriptive, cultural-historical reconstructions to an emphasis on processes of cultural change and the relationship between paleoclimate and human adaptation. In 1963 the University of Wisconsin-Madison undertook excavations at five Mill Creek sites on the Little and Big Sioux including Kimball (Bryson and Baerreis 1968; Henning, ed. 1968, ed. 1969). The results supported a positive relationship between climate and culture change and established a conceptual model for understanding Plains village cultures which was applied over the next two decades (Bryson and Baerreis 1968; Bryson et al. 1970; Wendland 1978). This research also trained and inspired an entire generation of

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Midwestern archaeologists who produced theses and dissertations on Mill Creek and related sites wrestling with such diverse issues as ceramic classification (Alex 1981a; Anderson 1972), economy and environment (L. Alex 1973; Benn 1974; Dallman 1977; Scott 1972; Wegner 1975; Zalucha 1982a), community patterning and social organization (Tiffany 1978b; Zimmerman 1971), and taxonomy and chronology (Peterson 1967; Vis 1968). The application of the Willey and Phillips classification (1958) led Ives to group Mill Creek sites into Little and Big Sioux phases (1962), and by the end of the decade researchers (Anderson 1969a, 1972; Henning 1970) argued for placing the Iowa sites within the newly defined Initial horizon (later variant) of the Middle Missouri tradition of the Plains Village pattern (Lehmer 1971). A new suite of radiocarbon dates, some from deep deposits such as Kimball, and tandem research at a number of Great Oasis villages including Broken Kettle West advanced understanding of the local origin of Mill Creek and the nature of its relationship to Middle Mississippian developments (Anderson 1969a, 1969b; Bryson and Baerreis 1968; Henning 1967, 1969a, 1969b, 1969c; Henning et al. 1968; Peterson 1967a, 1967b). During this period also, several mortuary sites including an ossuary believed to have a Big Sioux phase affiliation were documented by professionals and amateurs typically as salvage excavations following unintentional disturbance or looting (Anderson and Baerreis 1973; Lily and Banks 1965a, 1965b).

Field investigations at Big Sioux phase sites by 1970 increasingly resulted from legislatively-mandated cultural resource management studies and accidental discoveries. Survey and excavations by the University of Nebraska and Sanford Museum at the Gytens site (13PM60) and the mixed Great Oasis-Mill Creek Larson (formerly reported as Larsen) site (13PM61) on Perry Creek (Henning 1982a, 1982b, 1982c, 1982e, 1996, 1998), provided important new information concerning the chronological and cultural relationship between Great Oasis and Mill Creek and the origins of the latter (Henning 1982c, 1996; Tiffany et al. 1998). In 1972 construction uncovered a major mortuary facility at the Siouxland Sand and Gravel site (13WD402) producing a spectacular array of artifacts and precipitating activist and social protest events which ultimately led to the passage of Iowa's landmark 1976 protective burial legislation (Anderson et al. 1979).

Stage 4, 1980s to present: Revisions, Reanalyses and New Directions

The past thirty years overall have been characterized by major revisions of Initial Middle Missouri taxonomy and chronology (Henning 2001, 2005, 2007; Henning and Henning 1978; Johnson 2007b; Lensink 1993b, 1997, 1998; Lensink and Tiffany 2005a; Toom 2003; Johnson 2007b; Tiffany 1982a, 1983, 2007a; Toom 1992a, 1992b; Wood 2001), and reanalyses of existing data resulting in new interpretations concerning the relationship between climate and culture change (Laird et al. 1996, Laird et al. 2003; Lensink 1993a; Tiffany 1982a; Zalucha 1982a), the applicability of radiocarbon dating (Lensink 1992, 2003a, 2003c), and possible socio-cultural processes that brought about these first Plains villagers, and that explain their interactions with Middle Mississippian communities and their ultimate demise (Anderson 1987; Benn and Green 2000; Finney 1993; Henning 1971a, 1996, 2007; Henning and Henning 1978; Henning and Toom 2003; Lensink and Tiffany 2005a; Tiffany 1982b, 1987, 1991a, 1991b, 2003b; Tiffany and Alex 2001;

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Tiffany et al. 1998; Toom 1992b; Wood 2001). The shorter time span now calculated for the occupational duration of all Initial Middle Missouri variant sites suggesting their contemporaneity, has implications not only for the historical relationship between communities but calls into question the applicability of radiocarbon dating during periods of rapid culture change. Studies of ceramics including cross dating (Lensink and Tiffany 2005a) and artifact source analysis (Fishel 1995b; Fishel and Titcomb 2009) offer ways to date and trace interaction between distant communities. The documentation of the only known agricultural field system on the Prairie-Plains border at a Little Sioux phase site (Gartner 2003; Lensink and Alex 2008) together with recent Mill Creek paleoethnobotanical and faunal studies (Adrain 2003; Jones 1993; Powell et al. 2009) and soil analysis (Plummer 2006), offer new prospects for understanding the economic system of Mill Creek communities. Nondestructive techniques applied to both Little Sioux phase sites (Alex and Lensink 2001; Goodmaster 2007a, 2007b; Lensink and Alex 2008) and recently to the Kimball site (Kvamme 2009) suggest the direction of future field research. While a number of Big Sioux phase mortuary locations were recorded during this period, excavation was confined to salvage of burials accidentally uncovered at several sites, including Spirit Knoll, 13PM248, a large ossuary/cemetery adjacent to the Kimball site, limited field school excavations at Broken Kettle (Doershuk et al. 1999), and minimal testing at Kimball in preparation for this NRHP nomination (Whittaker 2010).

Historic Context Research

No Big Sioux phase sites in Iowa have been listed on the NRHP. Four villages of the Little Sioux phase of the Initial variant of the Middle Missouri tradition are on the National Register: 13BV1 (Chan-ya-ta, listed 1978), 13CK15 (Brewster Site, listed 1979), 13CK21 (Phipps, listed 1966), and 13OB4 (Wittrock, listed 1966). Phipps and Wittrock have been designated National Historic Landmarks.

A general review of the published literature on Big Sioux phase archaeology was undertaken. Reports studied included Alex 1981a; Anderson 1969a, 1969b, 1973a, 1975a, 1975b, 1975c, 1977, 1978, 1981, 1985a, 1985b, 1987; Anderson et al. 1979; Anderson and Baerreis 1973; Banks and Lilly 1968; Bryson and Baerreis 1968; Fisher 1977b, 1978, 1980, 1983; Fugle 1957, 1962; Henning 1980, 1982c, 1996; Henning, ed. 1968, ed. 1969, Henning et al. 1968; Ives 1962; Johnson 2007b; Lillie 1996, 2004a, 2004b; Lillie and Schermer 1990; Lilly and Banks 1965a, 1965b; Orr 1942; Schermer et al. 1998; Stafford 1906; Thiessen 1976; Tiffany 1982a, 1983, 1991a, 1991b, 2007; Toom 1992c; and Wakefield 1887. Some sites have little documentation, with all available data found on Iowa Site File forms. The major references are compiled in Section I.

Additional research is needed in order to develop a second recommended context, *Little Sioux Phase, A.D. 1100–1250*. The Little Sioux phase is considered one of two phases in Iowa belonging to the Initial variant of the Middle Missouri tradition. Radiocarbon evidence indicates that it falls within the same time range as the Big Sioux phase, A.D. 1100–1250. It shares in all of the defining content characteristics of the Big Sioux phase historic context as outlined here, and its component sites have the potential to provide equally significant new information related to a similar set of research questions as outlined in this MPDF.

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The Little Sioux phase, like the Big Sioux phase, has been a recognizable archaeological entity (definable in space, time, and content) to Midwestern and Eastern American scholars since at least the 1930s by which time it had been identified and classified as one of two recognizable cultural subdivisions in northwestern Iowa called the Big and Little Sioux foci (later, phases) (Griffin 1935; Ives 1962; Keyes 1927, 1935a; McKern 1939). Together these two comprised the Mill Creek culture, first defined and named by Charles R. Keyes after Mill Creek, a tributary of the Little Sioux River where sites were well represented (Keyes 1927). Twenty-eight component sites, consisting mostly of nucleated, compact, fortified villages, are recorded in the Little Sioux locality along the Little Sioux River and three tributaries: Mill Creek, Brooke Creek, and Waterman creeks, in Cherokee, Buena Vista, and O'Brien counties mainly in the physiographic region known as the Northwest Iowa Plains (Prior 1991). The question of a Perry Creek phase has been addressed in Sections E and F of this Multiple Property Document.

In a number of aspects, however, the Little Sioux phase exhibits sufficient differences from the Big Sioux phase to establish another, though complementary, set of research questions. These differences include:

- Geographical location: the Little Sioux phase is spatially separate from the Big Sioux phase and occupies another physiographic region. Component sites are found on a different drainage system, in this case the Little Sioux River and its tributaries.
- There are more Little Sioux phase sites, at least twice as many, than found in the Big Sioux phase.
- Little Sioux phase sites occupy a spatially larger area than Big Sioux phase sites.
- There are few to no Great Oasis sites found in as close proximity to Little Sioux phase sites as is the case in the Big Sioux locality.
- Bison remains appear to dominate the large mammal assemblage in Little Sioux phase sites.
- There are no Little Sioux phase sites that clearly exhibit transitional Great Oasis to Mill Creek occupations as appears to be the case at Big Sioux phase sites such as Larson, Gytens, and possibly at Broken Kettle "South," an area adjacent to 13PM1 which produced evidence of mixed Great Oasis and Mill Creek ceramics in pit features (Anderson 1969b).
- Two Little Sioux phase sites contain the only known, existing archaeological evidence for intact agricultural field features.
- There are a greater number of Little Sioux phase sites that have or had documented evidence of fortifications consisting of ditch and palisade line surrounding a compact settlement of rectangular lodges.
- Two of the Little Sioux phase sites have produced evidence of house patterns other than the typical IMMT rectangular lodge.
- Almost nothing is known about the mortuary patterns of Little Sioux phase peoples.
- Fish weirs are a site type only known from the Little Sioux phase locality.

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Determination of Historic Contexts

All examined site records appear in the Iowa Site File (ISF) as "Mill Creek" culture sites. Information gleaned from examined sources was distilled into a database of Mill Creek (now known as Initial variant) sites in Iowa. A total of 51 Mill Creek culture sites appear in the ISF. These include 32 sites of the Little Sioux phase, 16 of the Big Sioux, and three outlier sites where Mill Creek ceramics have been found (13DK95, 13DK97, 13ET403). Two of the Big Sioux phase sites (13PM11-12) presently do not have enough accumulated information to truly be considered Initial variant, and were removed from consideration. This information was transferred to a Geographic Information System showing the location of these sites on the landscape.

The Big Sioux River drainage basin in Plymouth and Woodbury counties is one of 10 localities occupied by Initial variant people, and one of two situated in Iowa. Big Sioux phase sites signify the beginning and demonstrate the actual origin and initial development of the Middle Missouri tradition. *Big Sioux Phase, A.D. 1100-1250* was targeted as a historic context because of its importance not only to understanding Initial variant peoples, but understanding the people of the Middle Missouri tradition as a whole. To date, 14 sites have been identified in association with the developed context, including six villages and 11 mortuary facilities. Three of the villages are also mortuary facilities (see sections E and F).

Identification of Property Types

The property types are organized by Middle Missouri tradition site function. After all known sites of this tradition were compiled into a database, an attempt was made to sort them into functional categories. Since the Big Sioux phase was the focus of the present historic context, these site types were scrutinized. Iowa Site File "site types" for these sites included burial(s), ossuary, cemetery, and village. Review of the distinction between the burial types revealed no consistent differences. The decision was made to call all recorded sites that contained known or suspected human remains a "mortuary facility." All known Big Sioux phase sites in the geographic area can be categorized into one of the two identified property types: village or mortuary facility. Three of the 14 sites are composed of both property types. Future research may define additional property types.

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Figure 4. Artist's reconstruction of a typical Initial variant lodge (from Alex 1980:130).

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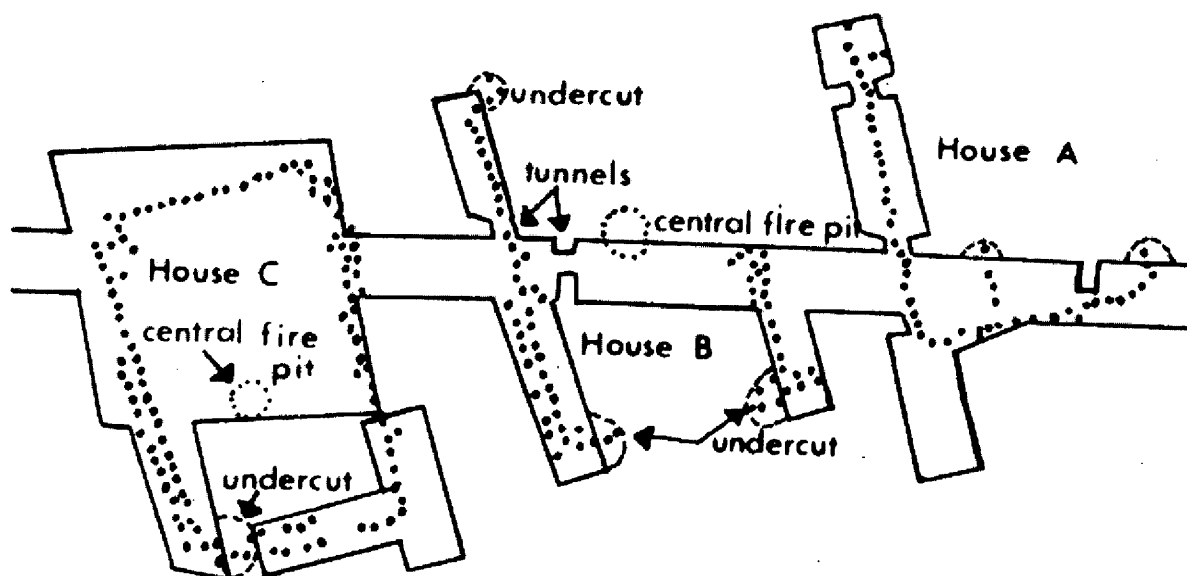


Figure 5. Orr's detail map of feature (including house) locations at Kimball Village (redrawn from Orr 1942 in Alex 1980:133).

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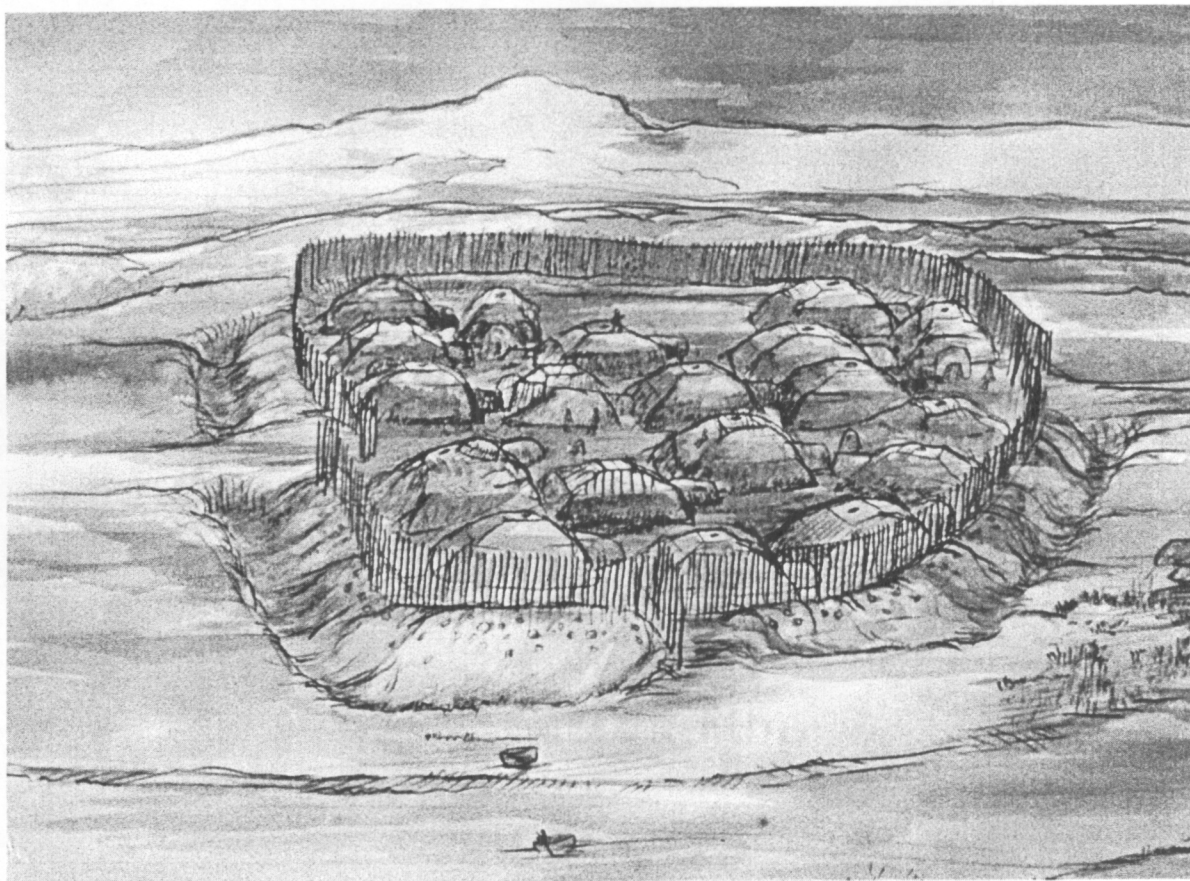


Figure 6. Artist's reconstruction of Wittrock Village (13OB4) (from McKusick 1973).

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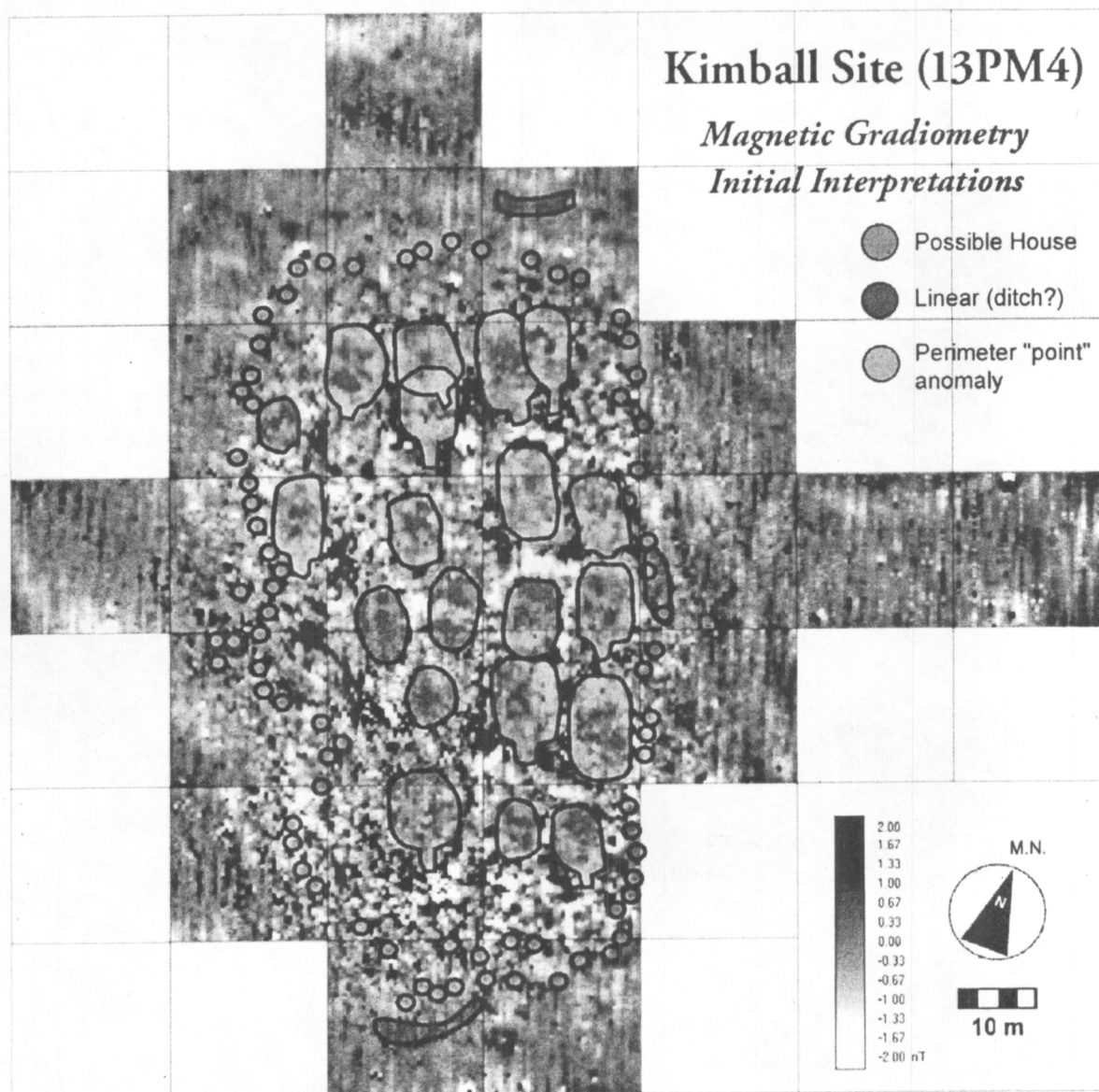


Figure 7. Magnetic gradiometry map depicting probable house features and palisade at Kimball Village (initial interpretations from Kvamme 2009:7).

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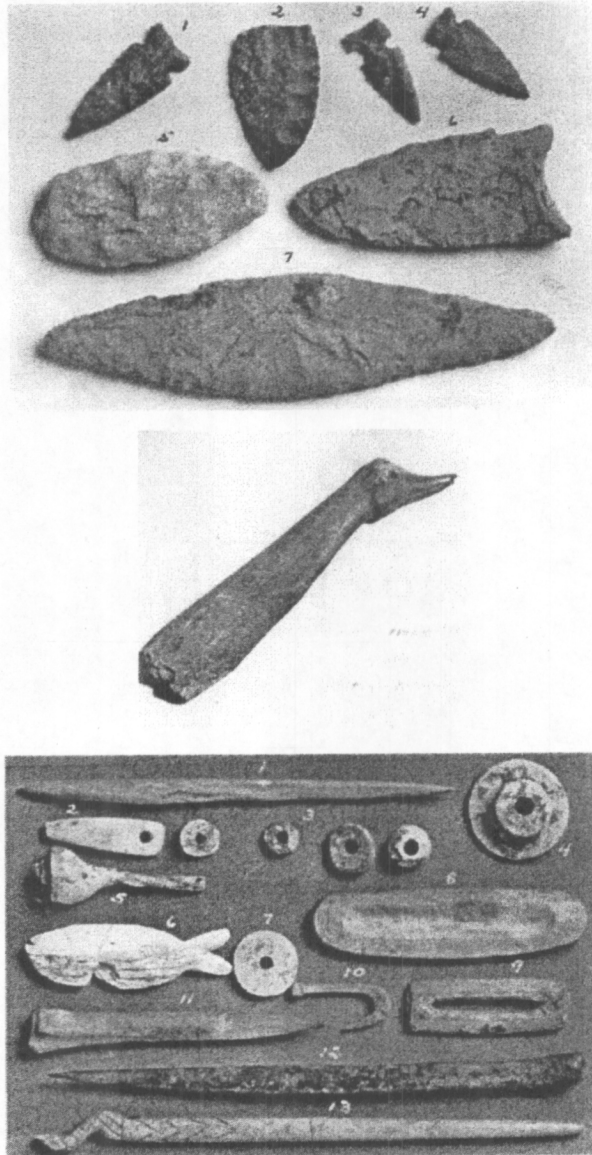


Figure 8. Photographs of select non-ceramic artifacts from 1939 excavations at Kimball Village. (composite from Orr 1942:102, 111, 110). Paraphrased captions. Top: Assorted chipped stone tools, including projectile points and knives. Center: Crane effigy carved from elk antler tine, from Storage Pit 1 in House C. Bottom: 1. Double-end perforator 2. Bone pendant 3. Four bone beads 4. Ear ornament 5. Marine shell ornament 6. Fish-shaped ornament made from clam shell 7. Bone bead 8. Fish hook blank, made of bone 9. Bone for making fish hooks 10. Bone fish hook 11 and 12. Bone awls 13. Half of a hair pin.

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Figure 9. Photographs of select ceramics from 1939 excavations at Kimball Village (from Orr 1942: clockwise from top left, page 108, 109, 146, 113). Top left: "Rope Fillet" (Ives 1962:25, 58) and Sanford Plain with Mississippian design motifs on the shoulder—a common form of local imitation of Mississippian styles on Initial variant Pottery. Top right: Assorted Mill Creek ware items: 1. Ladle 2 and 3. Bird effigy handles 4. Miniature pot 5. Human effigy handle 6. Raccoon effigy lug or handle. Bottom right: Foreman Incised Triangle rim. Bottom left: Nearly complete Chamberlain Incised Triangle vessel.

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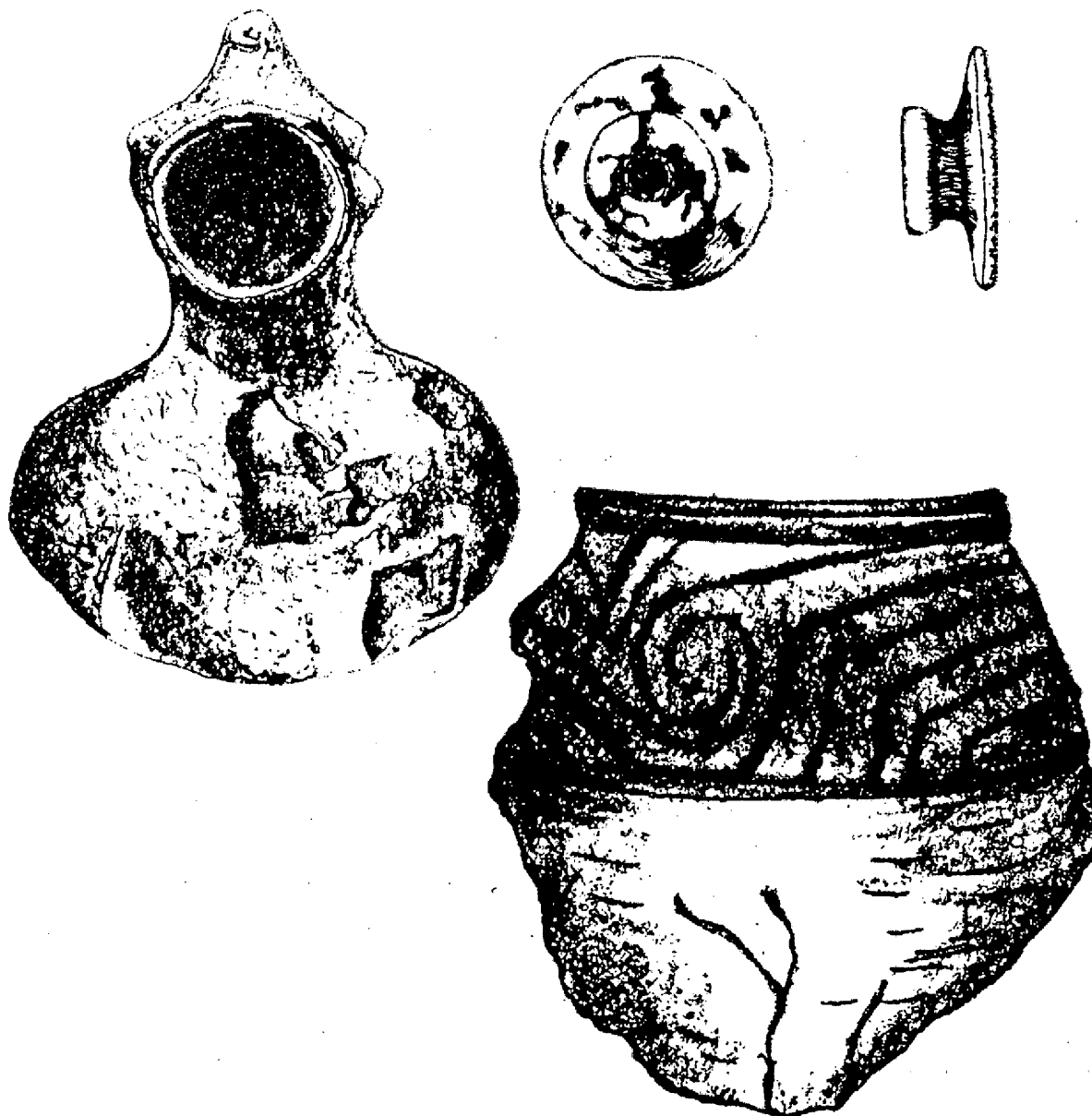


Figure 10. Artist's drawing of Mississippian-inspired items found in Big Sioux phase sites (from Alex 2002:4).

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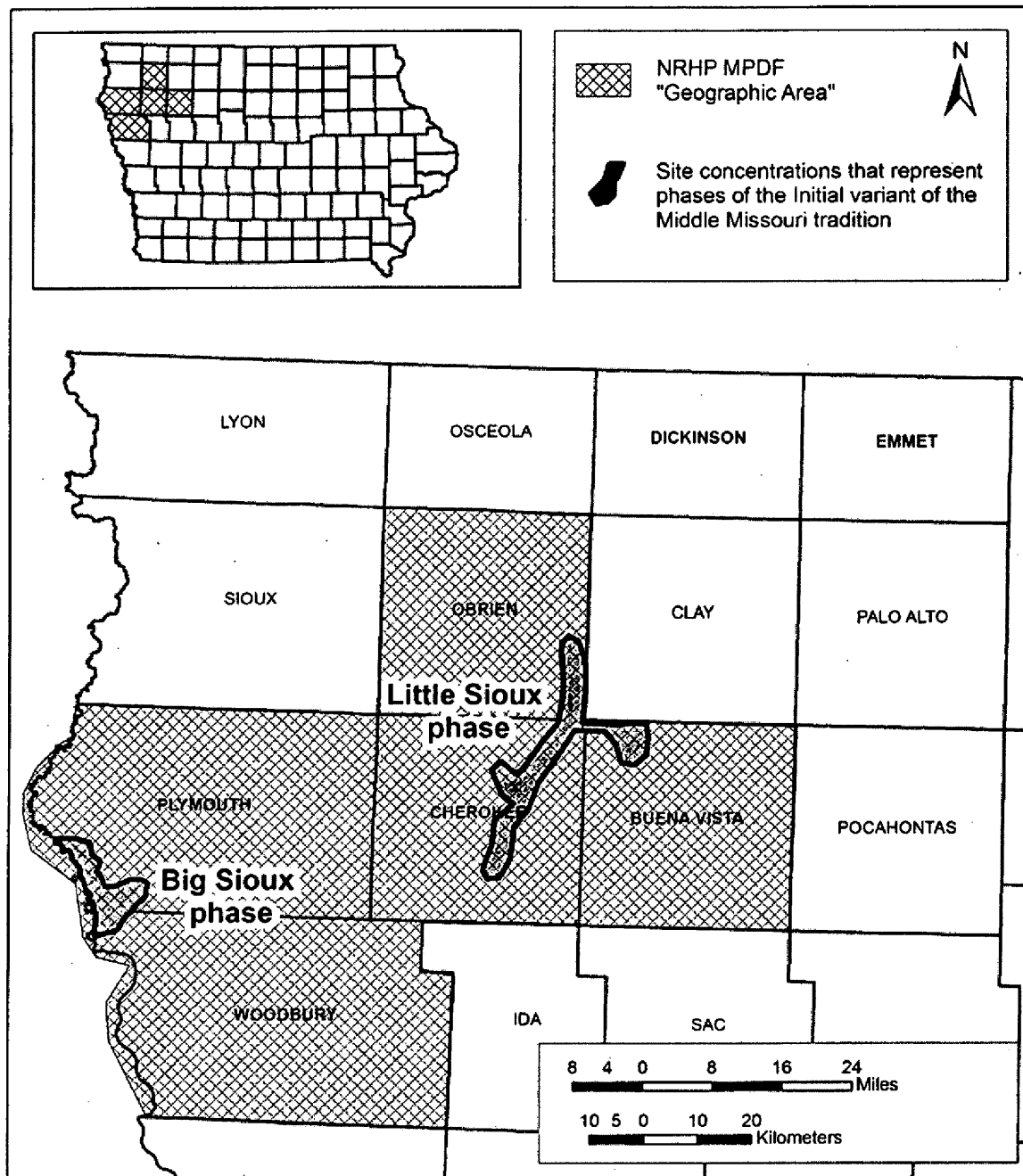


Figure 11. Location of the geographic area of the MPDF, Archaeological Resources of the Initial Variant of the Middle Missouri Tradition in Iowa in relation to modern counties (base map from Iowa Geographic Map Server 2009).